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The International Journal of
Orthodontia and Dentistry
for Children

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# *ORIGINAL ARTICLES*

## WHAT ARE THE POSSIBILITIES AND LIMITATIONS OF ORTHODONTIC TREATMENT?*

JOS. D. EBY, D.D.S., NEW YORK, N. Y.

THE title of this symposium is a question of what are the possibilities of treatment. The subject presented in this phase is so broad in scope that it may be asked of any doctor. There is no phase of the healing art to which this question is not applicable, and since the beginning of time doctors have been searching for the possibilities and limitations of treatment, and doubtless will continue to do so until the end of all physical infirmities.

Treatment in its broader sense is the administration of certain remedies to influence a given condition. Treatment may be divided into several phases, a few of which are applicable to orthodontia.

Empirical treatment is based on experience and hearsay; it is largely experimental. Until a comparatively recent time, practically all attempts at moving teeth resulted from this form of treatment.

Mediate treatment is that form which is based upon the knowledge of symptoms and the remedial measures to which they are known to respond. This form of treatment embraces orthodontia from its preventive possibilities and is a part of our field which remains largely open for future development.

Suggestive treatment is that form which may lend itself to the possibilities of a situation but is questionable, both in nature and in result.

It has been from these three classified forms that all branches of medical science have evolved.

Specific treatment is that form which is founded on definite facts so many times verified that there is little doubt left of the results to be expected of any individual case, unless some factors in diagnosis have not been foreseen.

Treatment may be divided into active, passive, casual, conservative, rational, radical, expectant and preventive.

*Section of symposium presented at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

In the range of malocclusion with all that it embraces from birth to the normal adult, the variations to be encountered are such that there is not one of the above mentioned divisions of treatment that cannot be positively identified with various kinds and stages of malocclusion. It is sometimes very easy to do a thing when it has been decided upon. In many instances it is not the action which has proved the success or failure but the decision behind it. If success or failure in action is the proof of the thought which produced the decision, then success or failure or any of their modifications are dependent upon the diagnosis which has brought the treatment into effect.

Diagnosis in orthodontia undoubtedly embraces as many conditions as practically any other branch of medicine or dentistry. From an anatomic standpoint, diagnosis of malocclusion represents the recognition of definite alterations in back of some phenomenon which is usually obscure or has only left its effects. A differential diagnosis is a comparison of given conditions with a norm or the variation from a similarly classified type. Before it is possible to make a thoroughly comprehensive diagnosis of malocclusion, it is necessary to be familiar with many scientific facts. These facts must be molded together into a working whole, and through the mixture of their combined efforts, working for good or ill, the basic factors of the condition at hand should be apprehended.

Among these scientific factors, each embracing a part which must be considered in diagnosis, is the knowledge of the genetics of life, biology, embryology, histology, the laws of growth, the influences of inheritance and environment, nutrition, metabolism, the endocrine glands, posture, habits, functional disturbances, and so forth.

The various methods of diagnosis may be referred to in almost the same terms as those of treatment. As selective as treatment has been, so has diagnosis, and it has usually been based upon the opinion of the individual operator, or through some one individual, that group which has chosen to follow him. Diagnosis, as well as treatment, in orthodontia has been largely a question of selecting some principles and following them consistently.

As the history of orthodontia has progressed up to the present time, the years have rolled by slowly and sometimes painfully. There has been a wide diversity in treatment based upon an equally wide range of beliefs on which principles of diagnosis were founded. In looking back, however, it is quite easy to see that practically every notable contribution by different individuals or groups, many of whom have failed to recognize the others, has had lasting effect in clearing both diagnosis and the resultant treatment.

There are many methods of diagnosis extant today. They differ largely within themselves. In my opinion, they all possess a great deal of good, but none is perfect or applicable to all the variations which Nature offers in the human face. Regardless of what methods of diagnosis he may be interested in, there are some facts which every orthodontist must eventually recognize. We know accurately the directions of growth and development of the face from the infant to the adult. We are familiar with all the biologic and physiologic laws which produce the tissues in quality and form. We are familiar with many of those enemy agencies which either constitutionally or locally may send their factors to prey on the

would-be normal and establish tendencies deviating this same vital, flexible, changing organism into a malformation. It is known that as osseous structures take form so must dental arches take form, or vice versa. It is known that the entire human face is one localized, composite unit, the various parts interdependent within themselves and the whole dependent upon external agencies. We are familiar with the fact that under certain conditions Nature is willing to respond to assistance. If the nutritional factors which supply calcium phosphate are present and no other hidden conditions such as glandular phenomena or inherited limitations are present, there is a willingness on Nature's part to respond to external agencies, either in development or in treatment.

The agencies at our disposal are principally the appliances. Many times Nature is ready and willing to respond but the appliance is wrong. Many times the appliances are right, but hidden away within the recesses of Nature is some resistance which we either are unable to see or have failed to recognize.

If these generalities are true, then the possibilities and limitations of treatment lie within our ability to appreciate the conditions at hand and to prescribe corrective measures accordingly.

It is my belief that the application of any form of treatment for the correction of malocclusion, whether it be in the form of mechanical apparatus, muscular exercises or any other medium, is as much a prescribed measure as any definition of the word "prescription" can mean. No internist has a right to deny a drug or to give an overdose knowingly. No surgeon has a right to operate unnecessarily or to overoperate knowingly. In a like manner, no orthodontist has a right to deny treatment or to overtreat knowingly.

The theme of treatment should be to possess that extent of knowledge which will produce such a fundamental background of foresight through the medium of diagnosis that will give Nature the degree of assistance required, and at the proper time. To express this same thought in other words we may say that the possibilities and limitations of treatment should make the operator capable of instituting the correct interference at the right time, and no more.

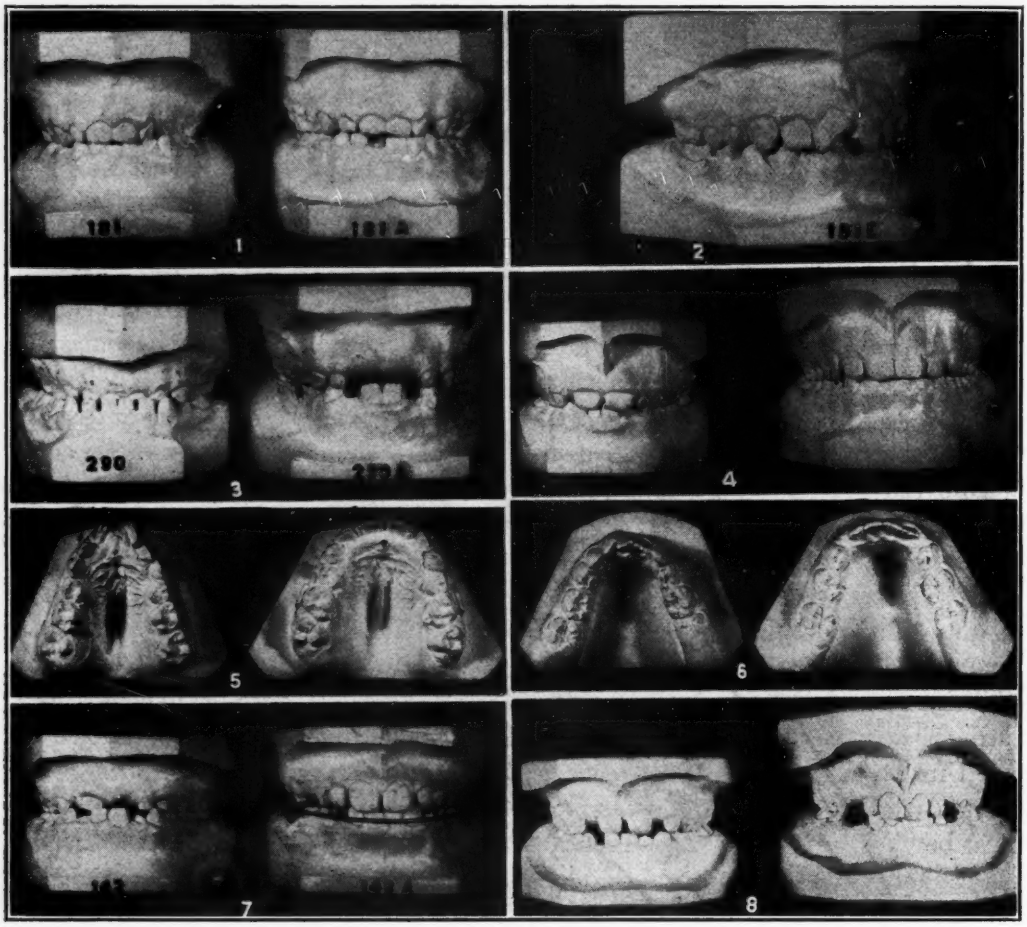
Unfortunately, in the present progress of the science of orthodontia there are so many hidden secrets in various individuals that the pursuance of this policy must be governed largely by a certain range of averages in which we are not as yet capable of apprehending in advance the specific response of the individual. This accounts for the many cases which we have all experienced where two almost identical conditions will act so differently under the best applied and similar treatment. This touches upon the law of variation which is undoubtedly as applicable to the human face as to any other localized area.

For convenience of description, stages of malocclusion may be divided into age groups, which are recognized by all orthodontists and have been discussed pro and con at considerable length.

The first age group is that before the eruption of the first permanent molars; the second, before the beginning of the absorption of the posterior deciduous teeth; the third, during the process of absorption of the posterior deciduous teeth and the eruption of the permanent teeth up to the second permanent molars; the fourth, through the "teens"; and, the fifth, adults.

In the first age group, I believe the general consensus of opinion is that there are but few advantages to be gained by treatment. During this tender age the intractability of the child not only makes the operation difficult, but is liable to produce some lasting effect upon the child as a whole which may be so damaging to the nervous system and general welfare as to outweigh the benefits produced.

At the same time, we must recognize that a large percentage of malocclusions either gain their inception or become apparent in this period. It is my opinion that any interference at this time is radical and treatment should be started only



Figs. 1-8.

under severe conditions. In those cases where the trend of growth is going to be seriously interfered with by function, I believe in the vast possibilities of treatment carefully applied at this stage.

Fig. 1 shows casts of a five-year-old girl with a neutroclusion, in which the left maxillary posterior teeth were intercepted by the mandibular teeth. There was a retarded development of the left maxilla and an overdevelopment of the mandible. The treatment applied, as shown in models *A*, required but a few months' time, and after only a short period of retention the mouth was released.

Fig. 2 shows the same case seven years later without any additional treatment. It cannot be known whether this treatment was indicated or not, but no harm was

done. It may also not be known what was prevented, and I for one did not care to assume the responsibility.

Fig. 3 is the case of a child three and one-half years of age with a so-called right unilateral mesioclusion. This case was so extreme that I doubt whether any one would question the possibilities of treatment. It responded readily, and although the models were taken in 1927, the occlusion and features are quite normal at present.

Of the next age group, before the absorption of the roots of the posterior deciduous teeth, much has been written and argued. I approach the question of treatment at this age with great hesitation, and I endeavor to reconcile every doubt before expressing an opinion. The principal debate is: What will Nature do unaided versus what is the value of improving the bony formation and the preventive influence which it will exercise upon the eruption of the permanent teeth?

Fig. 4 shows the casts of a girl seven and one-half years old, with a neutroclusion; there is sufficient space for only three mandibular permanent incisors, and there is a similar insufficiency of width in the maxillary arch. This case was treated with flexible appliances, and immediately upon the sufficient eruption of the laterals it was released. The second cast shows the same mouth five years later, in 1930, and the mouth is practically perfect today. I should have been loath to assume the responsibility by urging this child and her parents in Nature's favor to the extent of a malocclusion later. I believe that with the simple interference which was made at that time, preventive treatment in orthodontia was exercised.

Fig. 5 is the maxillary arch of a child seven years of age. It is a source of gratification to me to look beyond these teeth into the deeper structures and to think of the continued development of the entire superior maxillary area with all of its individual parts, including the sinuses, the nasal fossae, and the influence which this boost and the more normal function will have on the development of the entire skull through the deeper articulations.

Fig. 6 shows the models of the mandibular arch, with only three permanent incisors on the left and an arch fairly normal for age on the right.

Fig. 7 shows casts of a boy seven years of age with a mesioclusion showing marked facial tendencies. Model *A* was taken after one year's treatment. The appliances were moved in 1927, and this patient today presents a normal permanent dentition with a facial outline showing but a slight maxillomandibular deviation which would be noticeable only to one who was aware of his original condition. In the possibilities of the preventive value of treatment of this condition at this age, I should not have cared to assume the responsibility of waiting for the permanent teeth.

Fig. 8 is the record of a case which developed in a quite opposite manner. The original casts were made in May, 1929, and the second casts in January, 1932. There was about two-fifths sufficient space for the right mandibular lateral, and a poor condition in the maxillary incisal region. No treatment was accorded this case, and over this time of two and one-half years, Nature, fortunately, righted herself. It is my opinion that the particular conditions in this mouth

were probably not to be depended upon in all cases. However, it does illustrate the opposite thought, which is conservatism during the period we are considering.

Fig. 9 is an occlusal view of a maxillary arch wherein there had been the premature loss of the left deciduous canine and right deciduous first molar. The remaining deciduous teeth were radiographed and the roots found to be about one-half absorbed. It would have required many months for these teeth to have been exfoliated naturally. During that period, additional collapse would have been dangerous. With explanation and consent, these teeth were removed, as shown in the second cast.

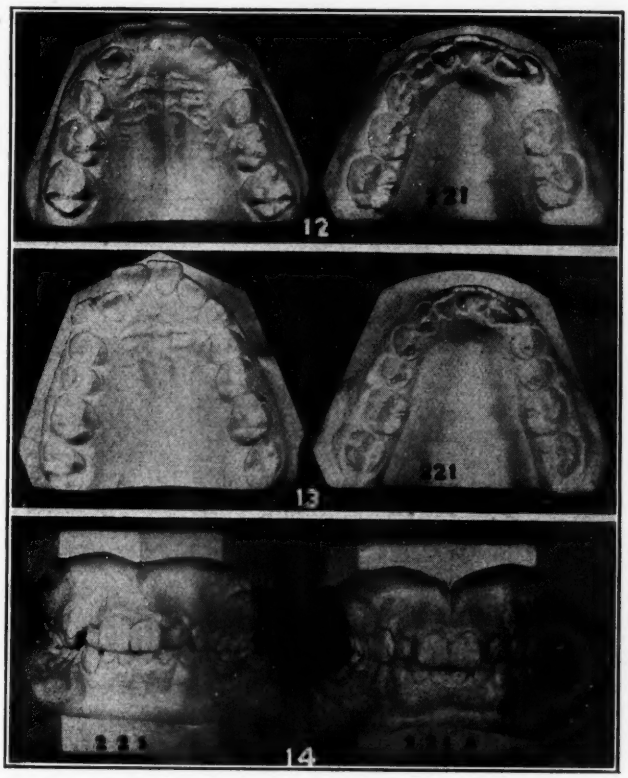
Figs. 9, 10 and 11.

Fig. 10 is the mandibular arch in the same case and shows premature losses, including the canines and two deciduous molars. These mandibular molars were removed at the same time with the eventual result as shown in Fig. 11. In hastening the loss of these teeth no harm was done. This case is presented for your criticism as to the possibilities and the advantages of removing deciduous teeth to facilitate the eruption of the permanent teeth under certain conditions.

Fig. 12 is the case of a girl nine years old who had suffered some premature losses, and her mouth did not look promising. The deciduous roots were quite absorbed and the teeth had been lost over a reasonable course of time. Treatment was deferred until she had erupted all of her permanent teeth, as shown in Fig. 13, at which stage it can easily be seen that the interlocked right and mandibular lat-

erals were the principal teeth to contend with. The treatment required to align these arches covered a period of eleven months. There remained a slight discrepancy in the laterals, as shown in model *A* of Fig. 14.

Merging now into the "teen" group, Fig. 15 presents a comparatively simple case of neutroclusion, but it possessed a unique complication in the position of the maxillary incisors. If one could visualize an alveolar fracture of the premaxilla, the positions of these teeth would look more natural. They had been drawn off the median line almost the width of a mandibular incisor and were elongated downward in the same direction, toward the left. I wondered what




Figs. 12, 13, and 14.

peculiar influence could be brought to bear to overcome this unsightly condition and make way for the permanent canines. Instead of instituting a lot of complicated apparatus to effect this forcibly, I determined to shift the teeth on what is referred to as the horizontal plane, and see what the influences of function would produce.

The second cast shown was taken two years later with a slight bit of the original condition remaining. However, with the continued trend of good influences, this mouth has become beautiful in a beautiful girl, with a minimum of treatment and yet with what I hope included for her the possibilities of treatment.

Fig. 16 shows a buccal view of a case with bilateral distoclusion in a girl thirteen years old. The incisors were neither protrusive nor particularly retrusive. It may not have been even a distoclusion. The external profile suggested

a posterior mandible. It may have been a case of inequality of form and location between bone and teeth, but at least the occlusal relations were wrong mesiodistally and treatment seemed urgent. This patient departed in May for the summer, and upon returning in the fall had grown considerably. On looking into her mouth, I observed that the changes we had looked for had occurred. The bite had opened, the occlusion had shifted to where the cuspal relationship had begun to be restored. Fig. 17 is a labial view of casts taken nearly three years after reten-

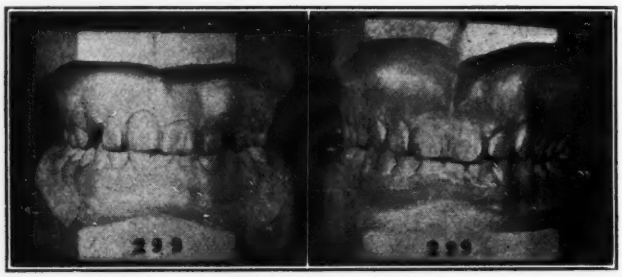
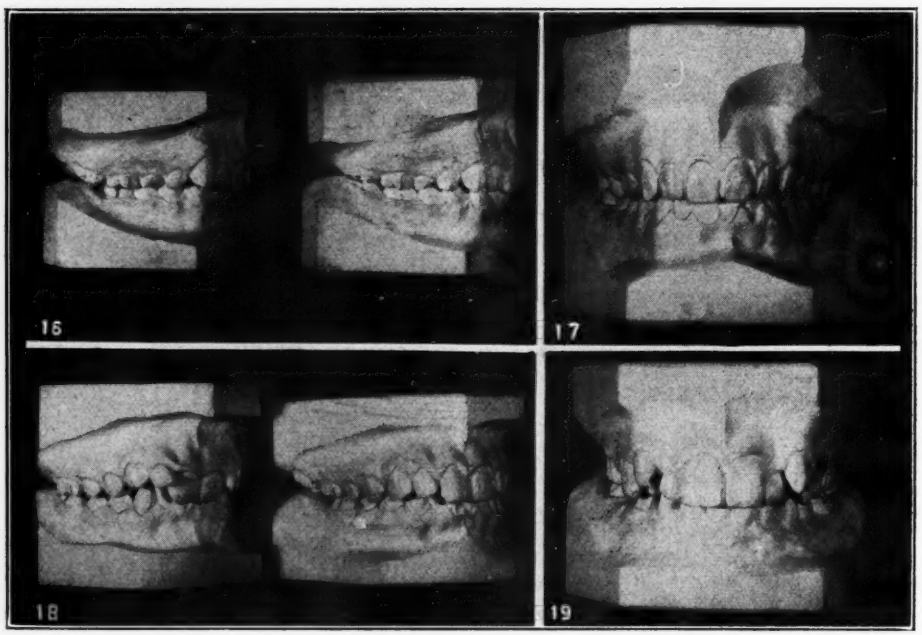


Fig. 15.




Figs. 16-19.

tion was removed. Improvement under function had continued to where the incisive relation, incisive overbite and occlusion were nearly perfect.

Fig. 18 is a case of posteroclusion, with retruding maxillary incisors which at this age required approximately two years to bring to the stage as shown. After a reasonably extended period for retention, the case remained successfully in position. I have felt that there was no period in this girl's life before or after when less could have been done. In this we must admit that after the eruption of the permanent teeth, including the second permanent molars and during the de-

velopmental period of the "teen" years, we have one of our greatest opportunities for the minimum amount of effective interference. If we are engaged in the establishment of adult teeth in adult faces, it is only reasonable that the form and volume of bone must be equal to the form and volume of tooth substance in order to fit the two together properly.

It is easy to discuss cases which have been reasonably successful, but it is more about our failures that we worry, and it is about failures that we like to hear. No one likes to condone a failure, and unless there is some palpable reason, we have slight ground on which not to blame ourselves. I believe, however, that there are inherent limitations within many cases which we are not fully capable of discerning.

Quoting Dr. Mershon's apt statement, "The teeth may be placed where we think they belong but will eventually be adapted to where they best suit the or-

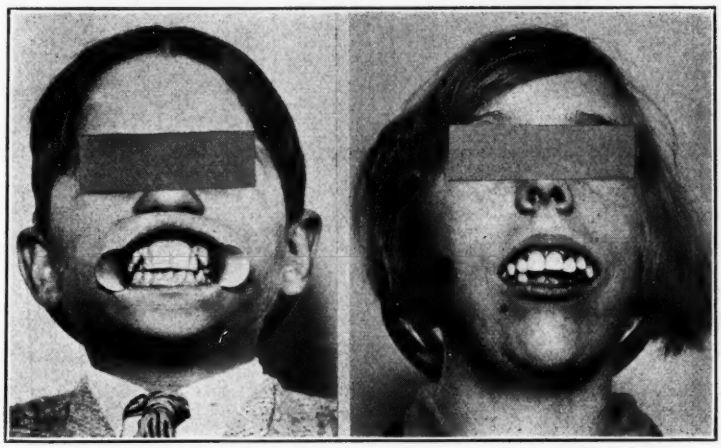


Fig. 20. Fig. 21.

ganism," is to bring out the point of the relation between the teeth and their investing structures, with special reference to form and position. It is possible for the developmental processes so to function as to overdevelop the volume of tooth substance, underdevelop osseous growth, or both, in the same individual.

Fig. 19 shows casts of some enormous teeth. The maxillary centrals are 10 mm. wide and 13 mm. long. They are in the mouth of a boy seventeen years old who is a perfectly proportioned dwarf, and, excepting his intelligence, you would take him to be a child of seven or eight years unless you looked at his teeth. He is exceptionally intelligent and has made accomplishments which bespeak a remarkable nervous system, and with the exception of some endocrine imbalances has no adverse symptoms.

This is an illustration of the difference between huge teeth and diminutive bones of the face. The only conceivable correction of this case would be the removal of teeth. The object in presenting this case to you, however, is to bring up the question of what to do about those cases wherein there is an indetectible difference which, nevertheless, exists.

Fig. 20 is a photograph of the boy whose casts are shown in Fig. 19.

Fig. 21 is a photograph of a girl whose dental development had so far exceeded her facial growth that it would be impossible to conform the two harmoniously. Fig. 22 is a photograph of casts showing the removal of all four maxillary premolars and the movement of the six maxillary anterior teeth back into contact with the molars, accompanied by the alignment of the mandibular teeth which necessitated the removal of the first premolars in order to produce an occlusion. Fig. 23 shows the occlusal view.

Fig. 24 shows casts of a boy fifteen years old who had lost a maxillary right central and had an interlocked right lateral. This tooth was brought over into

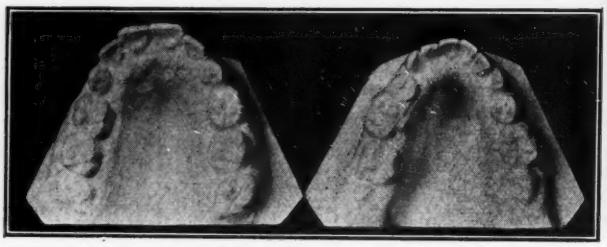


Fig. 22.

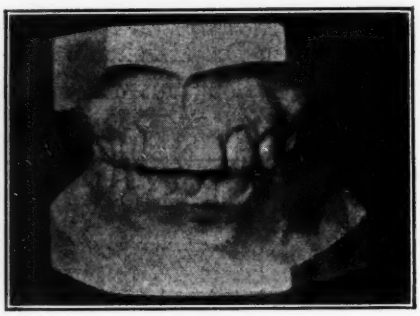


Fig. 23.

position and covered with a porcelain crown which made a practical but not perfect result.

Now passing out of the "teen" age to the adult, I frankly confess to a reasonable aversion so far as overextended efforts are concerned. If corrective measures in adults possess sufficient preventive values to stop further damage, or if improve-

Fig. 24.

ment can be permanently assured, orthodontic treatment should not be refused; however, in heroic cases, I prefer not to plunge into an obscurity in which only pain for my efforts will result. Some of the more extensive conditions of malocclusion in adults are more susceptible to treatment than lesser appearing ones. I believe adult cases are more favorable not in the extent of tooth movement but in the reasonable assurance of retention.

Fig. 25 is the case of a woman thirty years old. She possessed an occlusal relation of the maxillary posterior teeth the width of one premolar forward, but her facial balance with respect to chin position was not so bad. Believing that the bunching of the six maxillary anterior teeth was largely due to a mesial movement

of the maxillary posterior teeth, I planned a course of diagnosis based on the removal of the maxillary first premolars. This was done in rehearsal by sawing off the eight anterior teeth and waxing the six anterior teeth into alignment. This method has been advocated and followed successfully during the past twenty years by several of our most able thinkers. The result proved encouraging and the patient was willing to undergo the attempt.

Fig. 26 shows the final result after two years' treatment. In the range of possibilities and limitations, this patient was given a practical result most pleasing in change of appearance. The question naturally is, at what age could she have been treated idealistically or better? That fact will have to be left to con-

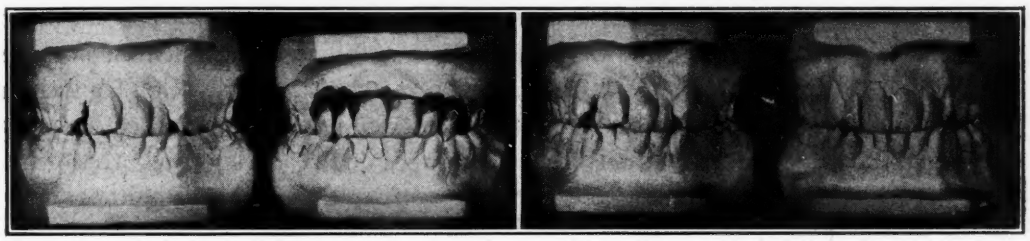


Fig. 25. Fig. 26.

jecture. Undoubtedly she could have and should have been treated younger. That period had passed. So it seemed that the possibilities and limitations of treatment at her age narrowed themselves down to certain limitations, but, nevertheless, something that she may enjoy the permanent benefits of.

By adopting these age groups, I have attempted to present one outstanding theme, which is that treatment as a prescribed measure should embrace the recognition of corrective measures involving a study far beyond teeth alone. There are many laws of nature to which we have to respond. It behooves us to recognize them. I believe in planning treatment to suit the case on the merits which it presents, but observation alone, with study, brings many happy conclusions. Let us keep our standards at the very highest and our ideals vested in perfect results. If we fail or fall short, let us never have the excuse that we have not exercised every precaution with only the patient's best interest in view.

# WHAT ARE THE POSSIBILITIES AND LIMITATIONS OF ORTHODONTIC TREATMENT?*

B. G. deVries, D.D.S., F.A.C.D., Minneapolis, Minn.

THE committee in charge of the program for this meeting must certainly be credited with the development of a unique idea in the matter of this symposium. It has unquestionably made use of the psychologic effect upon each essayist of not informing him of the names of the other contributors to the same subject. There can be no question but that our opinions are influenced because of reaction to the opinions of others. Again, we may frequently hold opinions and withhold full expression of them because of the knowledge that others may not share the same views. This is done sometimes out of courtesy for those who may disagree with us, and sometimes because of fear that our own opinions may not be so worth while as we think they are. I rather conjecture that the program committee was well aware of such points when this program was evolved and hoped that by these tactics the true thoughts of some of us might be brought out. Upon accepting the assignment given me, I ventured to write the Chairman that, in my humble opinion, this meeting might well resolve itself into one of two things—either a love feast or a battle royal. Knowing the propensities and proclivities of some of our members, I can well anticipate a materialization of the latter eventuality, but secretly I still trust in the mercy of the court. Every essayist who appears before this body realizes that this organization represents the largest group of men united in the same ideals of this particular service. From this group emanates thought which has made possible the great advancement of orthodontia as a specialty. This group has always represented, to me at least, the clearing house of ideas and actions which have had the most profound influence upon the practice of our profession. Can an essayist therefore be censured for experiencing some degree of trepidation when he finds himself expected to lay bare some of his inmost thoughts concerning the practice of his profession?

When I first considered a plan of approach to the subject assigned, my first thought was that it would be best presented by bringing out definite instances wherein certain types of appliances had revealed their advantages and shortcomings. To that end much time was consumed in analyzing case histories in detail. I then began to discover that the fundamentals underlying the analysis of all cases of orthodontic treatment were apparently identical. Two outstanding premises were obvious. In the successful culmination of treatment two factors had conspired to produce the desired result: first, an apparently correct diagnosis; and second, a correct handling of appliances. In cases where doubtful results were attained I have been compelled to consider them from two angles: namely, was my therapy at fault, or had I attempted to accomplish something

*Section of symposium presented at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

the attainment of which was highly improbable because of a faulty initial premise and analysis? In other words, if I had analyzed the conditions sufficiently from all angles, would I have instituted treatment as I did?

Fundamentally the possibilities of orthodontic treatment or anything else can only be measured by our own yardstick of perfection. To me at least, the possibilities of orthodontic treatment seem limited to the same degree as the particular human organism is limited in its intrinsic ability to attain the maximum of developmental and functional perfection. If this is true it becomes of paramount concern to us as orthodontists to try to ascertain, before treatment is instituted, what are the obstacles to attainment of our concept of normal which may be inherent in the particular instance. I say this frankly because I believe that not all individuals possess the same capacity for attaining a standardized normal. I state it also because I believe that in the knowledge of the degree to which this or that individual possesses or does not possess such residual capacities lies the largest group of reasons for failure or success in orthodontic therapy. The approach to this discussion therefore seems to me to lie not in a specific consideration of treatment of any one phase or classification of malocclusion but rather in a consideration of the principles which shall govern our mechanical therapy. I believe that in orthodontic practice it is not nearly so important what one does as what one decides to do in treatment.

It has always been inexplicable to me how any one can consider a malocclusion as a thing apart, something to be reduced mechanically to a given dimension. If we believe in the theory that thirty-two teeth in normal functional occlusal relations are the birthright of every human organism, and that every variation and deviation from this normal is due to mechanical environmental imbalances which are susceptible to correction through orthodontic treatment, be it "bone building," "stimulation," "bone growing," or what not, then I say that the practice of orthodontia may well prove a disheartening and unsatisfactory branch of the healing art at times. This may sound like a rather severe indictment of our profession, and the statement may be challenged. However, this view can well be supported by reviewing orthodontic trends in only the past decade. We find an ever increasing amount of literature dealing with orthodontic therapy, actuated solely by one idea, the universal effort to reduce satisfactorily various forms and classifications of malocclusion. This fact presupposes dissatisfaction with current methods. Our best and most skilled operators, when they are honest, admit difficulty in attaining certain objectives. The results of treatment by these same men have often not borne the stamp of perfection which, wrongly or rightly, may have been expected. Some of our most ardent enthusiasts and proponents of definite theories of therapy are evidencing signs of misgiving as to the soundness of some of their procedures. If unwilling to admit their misgivings, they at least are evidencing considerable interest in new developments of thought. In fine, it is becoming definitely apparent that orthodontics is far from an exact science, in the practice of which no standardized method of mechanical therapy can be universally applied.

If we are to believe in and credit the results of therapy as represented by case histories and findings of our finest and most conscientious operators, I should

almost be willing to admit that 90 per cent of actually required tooth movement can be accomplished. If this is true, I believe that our failures have been due to biologic factors which have been either unrecognized or not properly evaluated. This thought is not new, for the same opinion is evidently being held by many. Many years ago, Leroy Johnson began calling to our attention the biologic significance of malocclusion. Hellman's contributions to our biologic background have been outstanding. Along comes Simon with his challenge of our long established basis of diagnosis, to say nothing of Lundström's intriguing hypotheses, as well as the works of Howard and many others. What have all of these contributions pointed to if not to the necessity of an awakened realization of the importance of orthodontia's biologic background?

I have become so fascinated by reviewing much of our literature and comparing it to my own personal thoughts and observations as a clinician that I have been compelled to approach this subject from just that angle. I fear it may encroach upon the etiologic phase, but possibilities and limitations of treatment must always be indissolubly associated with etiology. The title of this discussion also seems rather a misnomer, for possibilities of anything must necessarily suggest limitations. You cannot discuss one without recognizing the other. Our horizon of possibilities of orthodontic treatment has also been tremendously broadened in recent years. For example, it was thirty years ago that Angle himself announced that he had now developed the "perfect" mechanism for the reduction of malocclusion. It was only a comparatively short time later that his prodigious energy had provided still another rung upward in the ladder toward perfection. The daily challenging of our precepts, principles and actions is essential to progress. This surely is the spirit which prompted this part of our program.

There are many of us today engaged in the practice of orthodontia who are challenging our own position as therapists. To put it more clearly, we are beginning to doubt our own ability at times. To be fair we can also truthfully say that we frequently marvel and wonder at the successful outcome of many of our attempts. I have the most profound respect for some of the members of our great profession, and yet I know that they all must have their moments of sober reflection when the gold of their accomplishments becomes a bit tarnished in view of failures. Last year I had a conversation with one such man whom you all know and respect, who has given much to orthodontia and whose example of fine professionalism is outstanding. In discussing our own personal reactions to our work, he said in essence, "You know, I have come home some days and remarked that if I knew of some business or activity which would provide me with a similar income I should like to get out of orthodontia. Then, maybe, a week later, I would find myself just bubbling with enthusiasm over the way some of my cases were progressing and feeling that orthodontia was the finest work in the world." I was glad to hear him express himself so, for I had often felt the same way. It is perfectly plain that every man who works in the physical field is liable to have his temporary discouragements, but I know of some who apparently never have such misfortunes; at least it is difficult to get them to admit them. This has made me wonder greatly as to my own qualifications and has applied the spur to my personal endeavor. Quite frequently I have found that my own limitations have been

responsible for my shortcomings. To be perfectly sincere, I have many times discovered that the problem which I had despaired of solving, resolved itself into a successful culmination when I admitted my own ineptness and shortcomings, abandoned my unsuccessful therapy, and availed myself of the experience of another. This train of thought has led me logically to the frame of mind wherein I now wonder how many of my failures in orthodontic treatment have been due to my own faulty analysis and technic. Have the limitations been of my own making or have they actually been beyond my control? If they have been self-made, how can I guard against their repetition; and, if they have been beyond my control, how can I recognize them in advance and govern myself accordingly?

If there were no possibilities of extending definite service to mankind, orthodontia would long since have ceased to occupy the position among the professions in which it finds itself today. It has been designated as the outstanding specialty in dentistry both because of its own development within itself and because of its contributions to general dentistry. This has not been purely fortuitous. Orthodontia has given a great deal to mankind and has successfully demonstrated its continued ability to do so. It is unnecessary to go into further detail on this point for we are all aware of it. Again, I believe that the greatest criticism of orthodontia has come from within the ranks of its practitioners, which is indeed a healthy sign. I believe that children in the hands of conscientious and qualified orthodontists rarely are dismissed from treatment without having received some definite benefit. It is because of our own high standards of accomplishment that we question ourselves in regard to our possibilities and limitations. Our failures to consummate these highest ideals are the causes of our greatest concern. It is curious to observe in this connection that in our consideration of the major mass of good accomplished and the minor mass of questionable service, the questionable looms up always in outstanding disproportion to the good. No man can have practiced orthodontia for twenty years or more and look back upon an uninterrupted chain of perfect results. He would indeed be a superman if he could do so. Within the mind of every one of us here are recollections of instances of failure to consummate for some of our patients the ideal with which we started their treatment. Perhaps the patients in those instances were made aware of the discrepancies in the results attained, left to draw their own conclusions regarding where the fault lay. Perhaps we allowed them to believe our results were all that they should be; perhaps we had promised them something which we found we could not deliver. In any event a small voice began to make itself heard before we were many years in practice. When this voice became sufficiently loud, we began to listen to it, and then we began to develop.

Personally I believe the possibilities of orthodontic treatment are tremendous. There are already too many case histories, too many successful achievements, too many thankful recipients of orthodontic service to refute any claim that it is not an outstanding health service. The orthodontist's conception of his field is based upon definite concepts of what constitutes normal occlusion of the opposing series of teeth, variations and aberrations in which are indicative of or responsible for changes in form and function of the teeth, jaws and associated osseous and muscular tissues. It is my belief that the degree of success we achieve in the treat-

ment of malocclusions lies most frequently in our ability to analyze malocclusions as being indicative or symptomatic of changes in form and function of the parts concerned, or as being responsible for such changes. Granted that within reasonable limits mechanics is capable of moving teeth into very nearly every position demanded, the varying ability of different individual occlusions to maintain their restored or changed occlusion under function has not been so clearly understood. If a corrected condition of malocclusion fails to stand up under function after

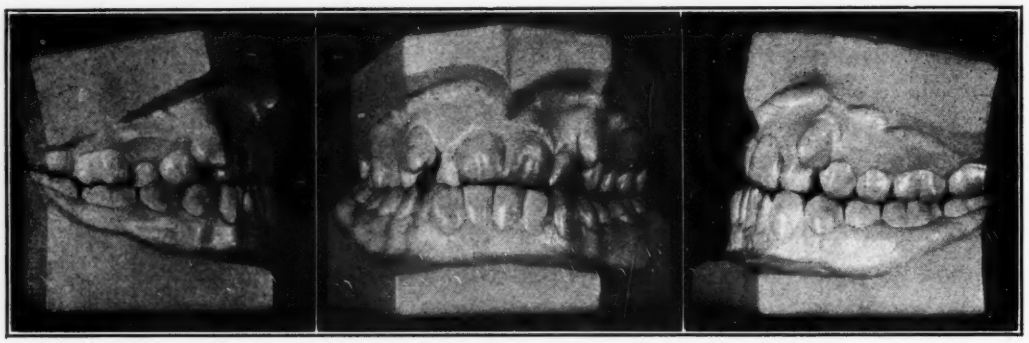


Fig. 1.

treatment has been discontinued, what is the cause? I believe the failure may be due to two things; an erroneous concept of normal for the particular case, and failure to recognize and evaluate probable biologic factors.

I am going to attempt to develop this thought by presenting three cases of malocclusion which will serve merely to introduce this discussion. Fig. 1 represents a malocclusion existing in a girl of fifteen years. She is physically well developed

Fig. 2.

and apparently in normal health. Her father possessed the same type of malocclusion, which may or may not be significant. In his case, the maxillary canines were extracted in adult life. This case (Fig. 1) is undergoing analysis now, and I believe that correct evaluation of both mechanical and biologic factors will control the degree of success which may be attained by therapy. It is admitted that this malocclusion may have presented a quite different aspect earlier in life, but the fact remains that we have the problem to contend with now.

Fig. 2 depicts a malocclusion in a girl of twelve years. Treatment of this case was undertaken in September, 1928, and has been continued more or less continuously ever since. Conventional lines of treatment were pursued with modifi-

cations as the case was revaluated from time to time. Figs. 3, 4, and 5 depict the condition in the apical areas as it exists today, three and one-half years since treatment was begun, revealing among other things evidences of root absorption. Characteristics of this case have been the decided loosening of the teeth during

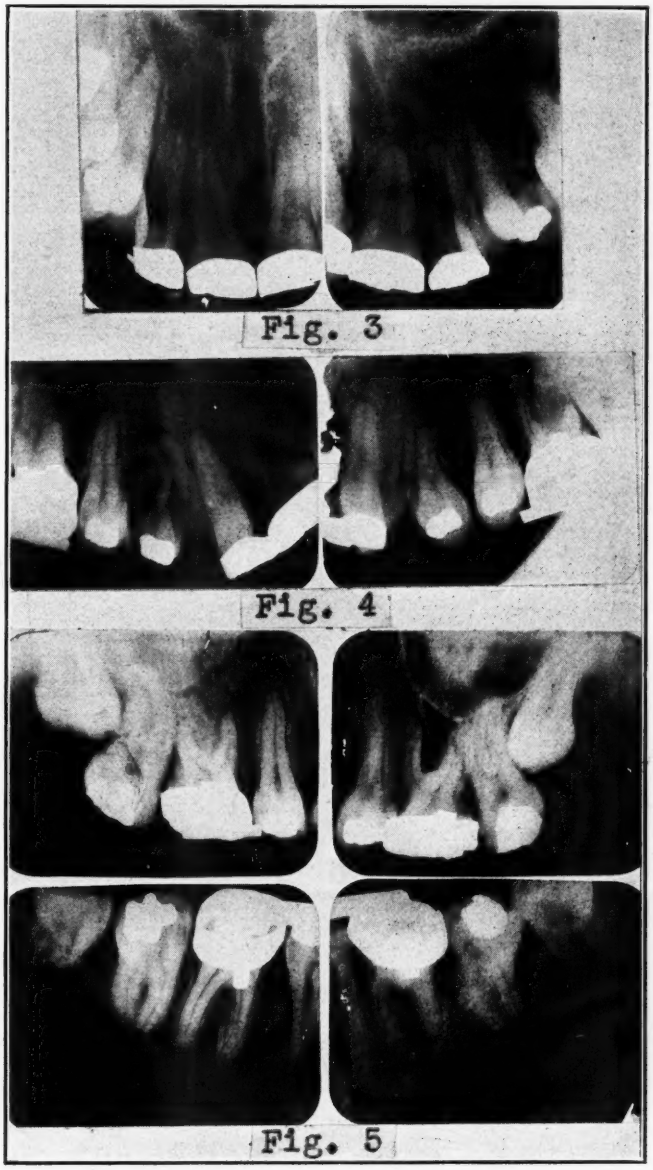


Fig. 3

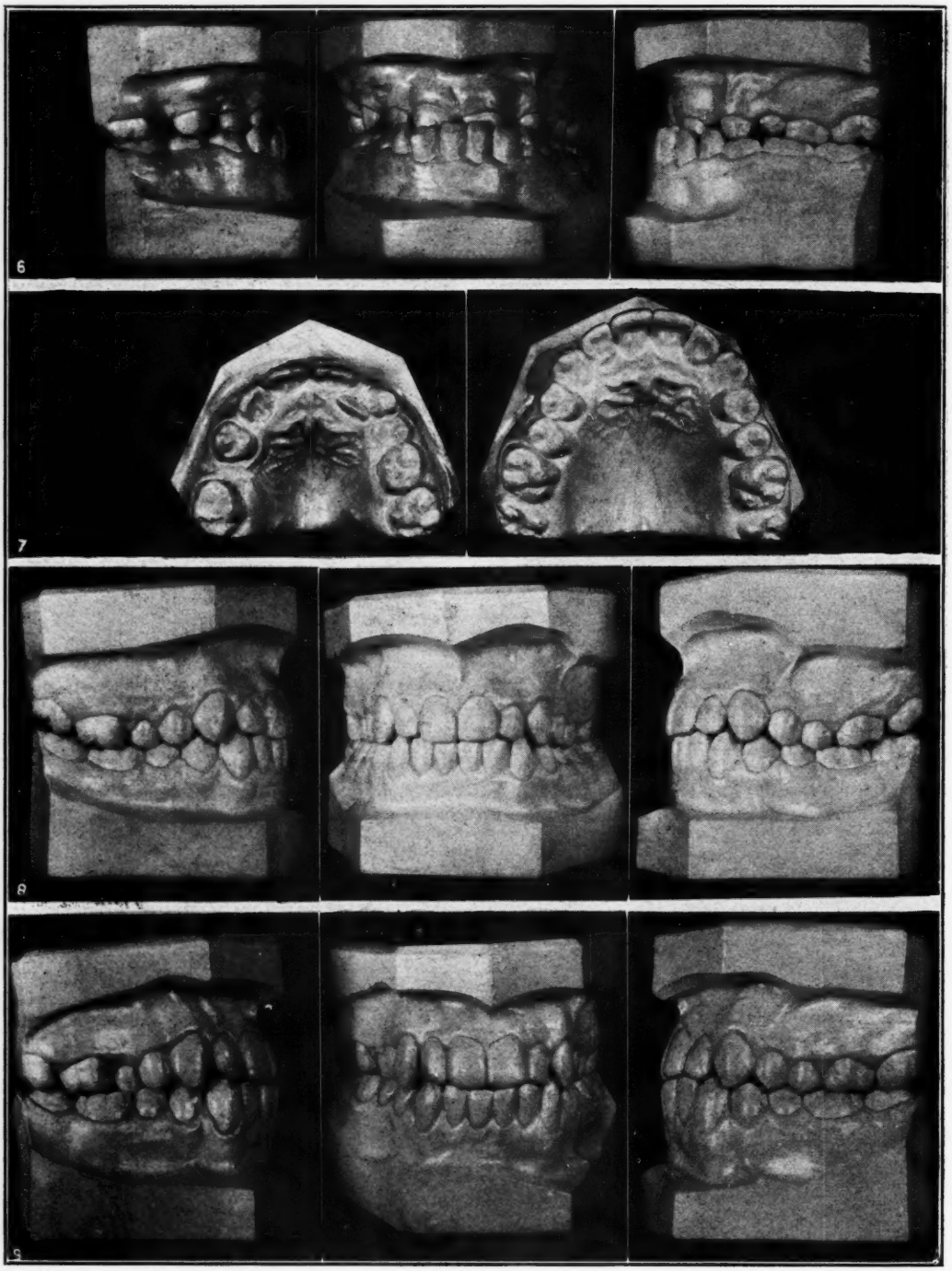
Fig. 4

Fig. 5

treatment and extreme distention and engorgement of gum tissue, almost resembling hypertrophy; this in spite of extreme care in band construction. To date I am far from satisfied with my handling of this case of malocclusion.

Figs. 6, 7 and 8 depict a malocclusion and the result of treatment in a boy of nine years. Treatment along conventional lines, based upon the premise of our common concept of normal, was undertaken. Active treatment was continued for

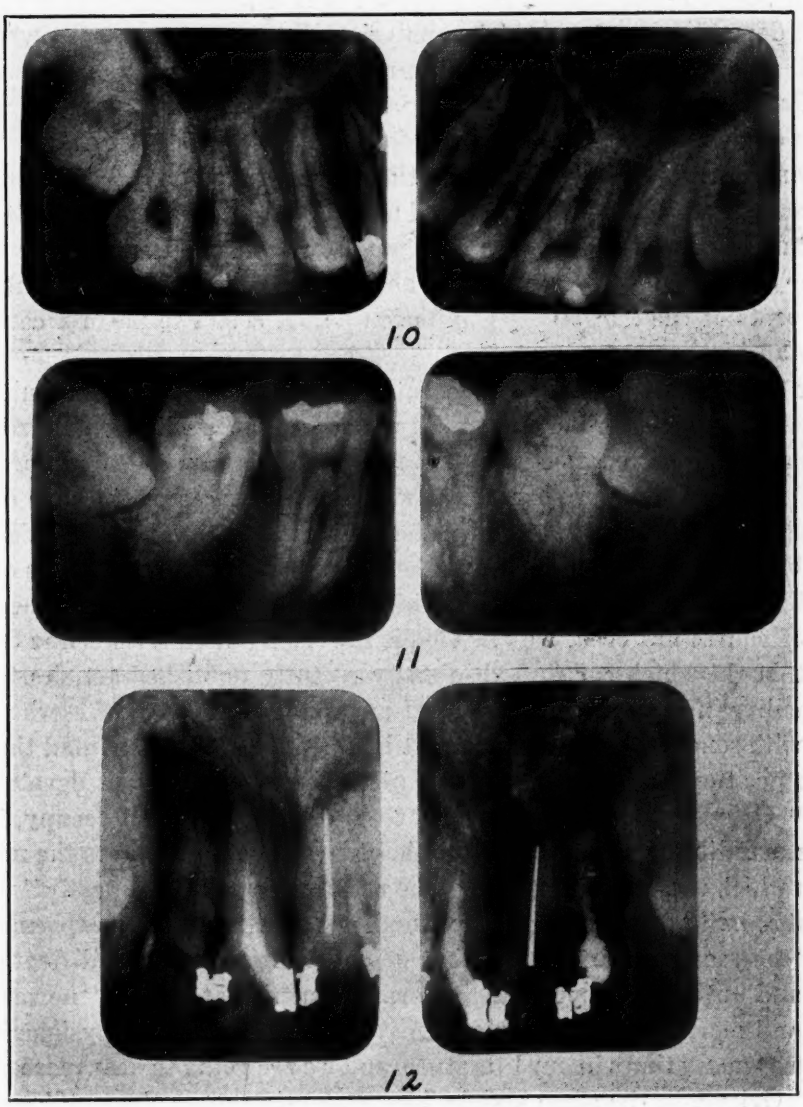
sixteen months when the patient was temporarily dismissed and appliances were removed. After a summer vacation, treatment was resumed for a period of ten



Figs. 6-9.

months when inactive appliances were placed. In July, 1926, all appliances were removed and patient was dismissed at the age of fourteen years. Certain discrepancies still persisted which may well be attributed to faulty technic.

Fig. 9 depicts the occlusal relation of this patient six years after dismissal from treatment. Figs. 10, 11 and 12 show x-ray findings taken at this time. This case is one of our check-up cases after a lapse of several years following orthodontic treatment. This lad's result was one which occasioned great satisfaction on the part of the parents, as well as on my part, for the seemingly outstanding service which had been rendered. At the time these radiographs were made, just a short




Figs. 10, 11, and 12.

while ago, the mouth gave evidence of gross dental neglect. Caries was pronounced in many of the teeth. The maxillary centrals and laterals were nonvital with pathologic conditions present as indicated, as well as absorption of root apices. The incisal occlusal relations were far from satisfactory. There were indications of absorption of the labial process in the mandibular canine areas, and third molar impaction was apparent. Whether or not the death of the pulps in the maxillary anterior teeth was due to orthodontic treatment or to invasion of caries may be de-

batable, since this patient was not under my observation during this lapse of time. Only inferences may be drawn. The fact remains, however, that tissue toleration was limited here. I have concluded that the possibilities of treatment were exaggerated in my analysis which did not include a proper valuation of possible limitations.

These three cases will serve as material to be discussed, and I wish to state that this entire paper is *not* a scientific treatise; it is a presentation of a clinician's views, not dogmatically stated. The analysis will try to portray my own train of thought in approaching any orthodontic problem. In the final analysis we are all, with but few exceptions, primarily clinicians. Most of us fill our hours with consideration of therapy to reduce facial deformity. We must look to our research-minded confreres for enlightenment on the problems we bring them. In the following discussion I wish to be understood as interpreting the term "limitation" to mean failure to attain and maintain, through orthodontic therapy, the relationship of the opposing series of teeth in function according to our commonly understood concepts of the normal. "Limitation" then comes to mean a compromise with such an ideal concept.

Some time ago my primary consideration in the analysis of cases similar to the ones depicted, as well as others, was the type of appliance which would most readily perform the mechanics necessary to bring the teeth into so-called normal relationship. Today I am more concerned with the influences which have conspired to bring about the deformity of which the teeth may be the index. This point of view has been reached because of my observation that all malocclusions of apparently similar character have not reacted identically to mechanical treatment. The question of course has been, why? One is now confronted with a line of serious thought, thought which is reflected in many recently published articles. For the sake of facility in pointing my remarks I am going to quote Grieve, who has just come out with some very positive and pertinent statements. I am glad that he has taken the position he has, for it has helped me considerably in developing my thoughts. Grieve says, in his opinion, "teeth ordinarily do not occupy, in either maxilla or mandible, a position distal to their normal relationship to the main body of bone in which they are situated." The use of the word "ordinarily" would indicate that *sometimes* they do. Grieve further states in his finely expressed analysis that "the too common error is that of endeavoring to expand dental arches laterally and anteriorly beyond their normal limit." It is that "normal limit" which should merit our serious attention. The term "normal physiologic limit" has appeared many times in our literature, and we are going to hear more and more about it. Grieve, in the same article, in commenting upon the profiles of a face after the reduction of a posteroclusion, says, "there is no doubt but that the teeth are still too far forward" and suggests a preferable therapy. Since this is a friendly and baring-of-the-soul discussion, I venture to remark that I have never been able to accept arbitrary standards of profile perfection, nor to understand wherein our own self-established standards of profile excellence apply indiscriminately to every individual. This would rule out of our consideration any belief, however remote, in the validity of any other factors as possible influences in the determination of facial contours. Apropos of the above and in regard to the

relative importance of the teeth as compared to bone and muscle as intrinsically represented in the individual, may I quote Charles who summarizes as follows: "Whatever the fundamental cause, there appears to be no real doubt that a bone grows because it has some inherent tendency to grow. External influences may affect a bone in that they may divert it from its natural course, but they do not cause it to grow. A bone tends to assume the shape and size which are *natural* to it, and only a gross external influence will turn it permanently from it. The majority of bones are of such ordinary appearance that this is not striking; it is only when one considers the manifold adverse influences which might influence any bone, that one realizes the wonderful approximation to *type* which the great majority make. . . . All things being equal, a bone or muscle will assume its own size and shape in spite of the influences which are brought to bear upon it and not because of them. If the influence is too definitely severe, the relationship of things may be thrown out, but there is in the body a tendency to assume normal form whether it functions normally or not. . . . I wish to breed a terrier with big bones; I do not exercise *any* dog, but I breed along the lines which I think will give me the desired result. If that dog has some trouble as a tiny puppy . . . and is kept back and does not develop as he should, he will still retain that *tendency* to be big-boned. But if the dog is normal, he will want to romp and exercise; but his big bone will not be due to the functioning of his muscles."

Regarding facial musculature, which surely plays an important part in our analyses of facial contours, there is another very recent work (1931) by Huber of Johns Hopkins, and among other things he says, "It is astonishing that a series of authors, some notable authorities, are still skeptical as to the occurrence of racial anatomic differences in the soft parts including the muscle system. While physical anthropologists in their studies of the various human races have given much attention to body proportions, physiognomy . . . and above all to the skeletal system with accentuation of the skull, they have greatly neglected the study of the soft parts, including the muscle system." Huber's findings reveal that the facial muscles grow in proportion to the whole head, thus greatly contrasting with the masticatory musculature. "The development of this latter group is evidently in close relation to the growth of the mandible." The author found in some instances in infants of from two to three years that the entire masticatory musculature greatly lagged behind the facial musculature, which was fully proportionate. This condition also held true in later cases. He concludes that more rapid growth of the masticatory musculature sets in with the acquisition of the permanent dentition and especially during adolescence, and points out that it is exremely noteworthy that two muscle groups, which are so close together, develop at such a different rate.

If we can logically deduce from the foregoing that there exists a definite, intrinsic capacity for a limitation to growth in the bone and muscle of individuals, it should become apparent that there can exist no universal normal for the individual as far as these characteristics are concerned. Their capacities as to the development of form and size are variable; although all unquestionably have potentiality for some growth and development. Insofar as the essential internal organs are concerned, there should exist a relative constancy in size and function wholly ade-

quate and normal for the individual, but it has been pointed out that the teeth may be considered as the less essential organs, and we can therefore look for and expect a greater variability in them in relation to other structures.

The more I read of and observe clinically cases of malocclusion, of which those alluded to may be taken as examples, the more I am convinced that actual disharmonies do exist between teeth and bony structures. Nor do I believe that the harmonization of the two tissues can always be accomplished by orthodontically placing, let us say, twenty-eight teeth into an occlusal relationship in agreement with our concept of the normal for mechanical balance. To hold to the contrary view would, in my estimation, arrogate to the mechanical relationship of the teeth a position of greater importance in the human economy than it deserves. When we are ready to state authoritatively that the orthodontic placement of the teeth into the mechanical arrangement demanded by an exact normal will overcome residual bony and muscular limitation of development, I will admit the error of my present position, but I do not think that time has yet arrived. Guided by our present knowledge I am willing to admit that compromises still have to be made, and this generally means the extraction of certain teeth, be they second or third molars, premolars or what not. May I here quote McCoy who says, "to assume the attitude that extraction in orthodontic practice is never indicated is just as illogical as to indulge in it thoughtlessly and too frequently. It has a place, although the indications for its use are infrequent to the extent that it cannot be regarded as a regular routine measure." The frequency of the occurrence of that "place" in every orthodontist's practice as yet seems to be a matter of individual judgment, and while the act itself may not be considered a "routine measure," its potentiality as a sane factor in therapy should be so considered in the analysis of many cases of malocclusion.

If we are beginning to find ourselves in a frame of mind in which we are willing to admit the possible existence of disharmonies between the teeth and the bony process itself, we are going to be forced into a train of thought which may well result in the development of a real biologic background for orthodontia. The foundation is already being well laid in the challenges to the possibilities of our particular work. Disharmony in the relationship between tissues of different epithelial origin, in as close apposition as the teeth and bone, may even be capable of demonstration. In this connection, I do not believe that we are sure of hereditary influences which might constitute limitations to orthodontic treatment. Regardless of differences of opinion among investigators of heredity, the fact remains that mankind in the spheres and circles in which we find ourselves is represented by many individuals of a variability in anatomic and constitutional types not to be explained in entirety from the environmental angle. Time will not permit more than the briefest mention of one or two points which might be pertinent to this discussion. I do believe, however, that they are pertinent if they suffice only to call to your attention the fact that you cannot dismiss lightly *any* of the biologic factors which have a bearing upon the derivation, determination and development of size, form and function of parts of the human being if you are seriously aware of the significance of malocclusion. Whether one is interested in noses, fingernails, long or short bones, or teeth, this applies, and the teeth and the alveolar tissues

present a rather particularly interesting picture in this regard. In the following remarks made by recent investigators you will note admissions that lead me to believe that certainty in their findings as yet does not exist.

When an orthodontist notes a recurrence of a similar malocclusion in two or more generations of the same family, the most obvious deduction is that he is face to face with an hereditary factor. It is easy to assert that a direct transmission is here in evidence. Adopted empirically, this point of view affords a comfortable hypothesis upon which to make inferences. Mature reflection and study of the tenability of this hypothesis, however, are bound to result in misgivings. We find that among investigators and authorities in this field there are differences of opinion existing, and new light is constantly being shed upon the problem. Quoting from Castle, "In modern times it was Weismann who first seriously questioned the theory of the inheritance of acquired characters, which had been assumed by Lamarck and, to some extent, by Darwin, the originators in the last century of the evolution theory. The assumption made it easier to understand how evolution might take place rapidly in useful directions. Weismann, however, pointed out the absence of critical evidence in its favor, the lack of any suitable mechanism for it, and asserted that the real mechanism of heredity lay in the chromosome. Germ cells do not arise from body cells, and so changes produced in body cells cannot be handed on to the next generation *unless there is some undiscovered mechanism for their transfer.* . . . The indifference of germ cells to body environment is illustrated in an experiment with guinea pigs. . . . A female albino guinea pig was deprived of her ovaries by a surgical operation, and in their stead was introduced an ovary from a black guinea pig of pure race. The albino female was now mated to an albino male, a mating which should have produced only albino young had no operation been performed. But there resulted only black young, such as the black guinea pig would herself have produced had the ovary remained undisturbed in her body. The environment of a white body did not affect the genetic character of the germ cells. To put it succinctly the germinal material is a legacy that has existed since the beginning of life, from which representative portions are passed on intact from one generation to the next. Around this germ plasm there develops in each successive generation a short-lived body, or soma, which serves as a vehicle for insuring the transmission and perpetuation of the former. The reason, therefore, why offspring resemble parent is because each develops from portions of the same stuff." Castle points out simply and clearly experimental results of the crossing of a colored smooth-haired guinea pig with a white rough-coated one. The inheritance of a rough-coated offspring depends on the presence of a rough determiner in a different chromosome (not the color bearing chromosome) of the rough parent. "Mendelian characters which have determiners (enzymes or what not) located in different chromosomes will be independent of each other in transmission. All possible combinations of them will occur in the second generation, in accordance with the laws of chance. If the genes from two characters are located in the same chromosome, they will stay together in transmission so long as the chromosome remains intact." In the breaking apart or dissociation of the chromosome a regrouping of genes occurs and a crossing over of characters occurs. Thus from the colored smooth-coated guinea pig and the white rough-coated pig there

is derived a white, smooth-coated offspring. In regard to size Castle says that the usual result of a cross between families or strains differing in size is to produce offspring of intermediate size and proportions. This is described as blending and he states further that "a small race will contain few factors contributing to growth, a large race will contain more factors, hybrids will contain an intermediate number." This investigator continues with remarking, however, that this is "difficult to test critically, and for this reason is not very satisfactory. It may or may not be so. Personally [he] is far from satisfied with the interpretation, although there is *as yet nothing better to offer in its stead.*"

The inheritance of acquired characteristics is of course the question around which revolves great investigation and discussion. The very fact that no one view is universally accepted challenges the position of those who unqualifiedly declare that such characteristics are not inheritable. It is also obvious that until this question is settled experimental work will continue to develop. I wish to call to your attention a rather recent group of experiments on this problem. Guyer and Smith in 1918 to 1920 and Guyer again in 1921, 1922 and 1923 demonstrated interesting findings in the transmission of eye defects, which tissue is of ectodermic origin. Fowl serum immunized to rabbit lens was injected into female rabbits at about the tenth or fourteenth day of pregnancy and several young were born with unmistakable eye defects, although there were no visible defects in the eyes of the dam. "The evidence suggested the possibility of breaking down the embryonic lens substance by the action of specific lens antibodies. The adult lens was uninjured because it was already cut off from the general circulation, but the embryonic lens could be attacked, since it was surrounded by abundant vascular tissue at the tenth to fourteenth day of pregnancy. The defects consisted of lens opacity, cleft iris, persistent hyaloid artery, microphthalmia and the like. Similar defects also followed active immunization with rabbit lens substance directly injected into a pregnant doe. The most remarkable feature of these series of observations is the fact that the defects were certainly transmitted by inheritance, even through nine generations in some cases. When defective males were mated to normal females of unrelated strains the offspring were normal, but the defects reappeared in the second filial generation." While Guyer's experiments were still being challenged, no definite refutation seems to be apparent.

The transmission of color blindness and internal ear defects seems to follow the same course in human beings. Both of these areas involved are of ectodermal epithelial origin of nervous tissue. The mechanism of active transmission may still be obscure, but the regularity of its incidence is admitted.

If the foregoing remarks on possible hereditary influences might be considered aimless, may I point out again that they are pertinent, for in the orthodontic problem we are dealing with tissues of different epithelial origin in immediate proximity. According to biologists the first beginnings of the teeth are represented by the anlages of the enamel organs which will form enamel and "serve as the molds of the future teeth." In other words, the determinant of future tooth size and morphology is an ectodermal derivant. The ectoderm, it must be remembered, gives rise also to the epidermis and its derivatives (subcutaneous glands, nails, hair and the lens and conjunctiva of the eye); to the nervous system and

the sensory epithelia; to parts of certain glands producing internal secretions, such as the pituitary body, suprarenal glands and chromaffin bodies. In the foregoing remarks we have definitely alluded to ectodermal tissue as represented by the hair and eye in recounting some hereditary transmissions. It would appear unreasonable to assume that experimental biology would pertain to only one or two derivatives of an epithelial layer to the exclusion of the others of the same derivation. Conversely, it would appear a logical hypothesis that experiments of similar character might well be extended to include the enamel organ of the teeth. There does not seem to be any reason why it should not be so considered, nor is it apparent that the work of Guyer and others has developed a hypothesis so untenable as to merit no further consideration. There is much room here for experimental biology pertaining to the size and morphology of the teeth, of which to date our dental literature evidences a decided paucity. Current experimental evidence would lead us to infer that the teeth would reflect inheritable influences from one or another parent; a blending of both; and could very well evidence morphologic changes and aberrations quite possibly of an acquired character. In any event the chapter in this phase of biology as it pertains to the teeth is not yet closed, and the proper frame of mind is an open one until more evidence has been disclosed.

From the foregoing short résumé it would appear that an analysis of malocclusion must logically take into consideration the fact that we do deal with two distinct tissues of different origin. Somewhere limitations of shape and size have been foreordained by hereditary transmission in the individual. Is it or is it not logical to assume that hereditary influences will always result in a harmony between teeth, bony process and musculature in the individual? Can it as yet be stated with authority that the correct mechanical alignment of the teeth according to our concept of the normal will always result in bony and muscular development which will not exceed the physiologic limitations of those structures? Are we justified in accepting wholly the idea that normal function, as we know and recognize it today, can overcome a tissue deficiency which may possibly be incapable of such development? The ability of individual resistance to certain invasions of the entire organism is known as constitution which to date cannot be measured.

If we remain open-minded on the question of the possibility of disharmonies existing between teeth and jaws, we may countenance with considerably more equanimity the extraction of certain teeth in certain instances, be they second or third molars or premolars, whether in the mandible or in the maxilla. To mention Grieve again, I note that he says, "There has been too much antipathy to the suggestion of removing any teeth as a means of overcoming the difficulty" (referring to the forward migration of teeth). I am not sure that "antipathy" is the correct word but it very nearly expresses it. If we are to conform absolutely to the theory of normal function of the teeth being able to overcome all residual developmental insufficiencies of process, we cannot countenance the removal of teeth except by admitting our own individual therapeutic inefficiency in the given case. If we begin to think of the probable biologic aspects of such cases which present to us, it is quite possible that we may begin to discover reasons which can very well challenge our right to subject patients to long continued orthodontic treatment in the hope of

accomplishing a probable perfection of result which may be contrary to biologic laws.

I have chosen the type of malocclusion referred to earlier in this discussion simply as a means of introducing a line of thought. The approach to any orthodontic problem must be started at some point, and it has become increasingly evident to me as years in practice pass by that the mechanical approach must give way to the biologic. It is comparatively simple to outline a certain mechanical treatment which has proved successful in a given number of instances, but it may or may not prove anything. The failures of orthodontic treatment should be of far more significance than the successes, especially if they be not idly dismissed from one's mind but rather are given serious thought. I am unwilling to believe any longer that all cases of posteroclusion are the result of tonsils and adenoids, thumb-sucking and other mechanical habits. Also, I question gravely that all failures to respond to orthodontic treatment are the result of improper dietary balance or lack of function of the teeth because of faulty food stuffs which provide too little masticatory effort. These factors may play a part in our therapy, but it is only a part. Hellman's contributions on the periodicity of growth and development in children explained much which prior to that time had been only surmised. Now, again, very recently, Howard comes forth with his splendid discussion of infra- and supraversion occlusions. Particularly illuminating is his observation that many cases of young patients presenting mild forms of these conditions make complete recoveries without mechanical assistance. Apropos of this and in line with this discussion of the limitations of orthodontic treatment I should like to say frankly that to me these types of condition offer obstacles to successful therapy second to none. I have never been able to "grow," "stimulate" or otherwise develop bone in a mandible beyond certain limits which seemed to be inherent within the mandible itself. Two outstanding instances of this character will serve to illustrate my point. These patients were sisters, and both presented with posteroclusions of the Angle Class II, Division 2 type, complicated by a linguoversion of the mandibular premolars and a decided overbite in the incisor region. Treatment was begun in both instances at about twelve years of age. The posteroclusions were successfully reduced by treatment, but in neither instance could perpendicular development be attained in accordance with *our* ideals of facial balance. The mandibles remained apparently deficient in perpendicular dimension, and the external facial disharmony was expressed by the short distance from the lips to the inferior border of the tip of the mandible. The mother of the two girls, as well as an aunt on the maternal side, presents identical facial contours. These facts do not prove anything, but to me they formed two of the earliest instances of my inability to produce by orthodontic treatment changes in facial dimension of the individual to conform with my former ideal of universal normal.

The most curious as well as fascinating fact about orthodontic treatment has been the magnitude of collective thought on the treatment of malocclusions of all sorts and degrees. To any one not an orthodontist the conclusion might be reached after reading much of our literature that our problems had very nearly all been solved. The orthodontists, however, are the ones who appear most dissatisfied, as is evidenced continually by the injection into our literature of disquieting new

thoughts and rebellions from previously expressed theories. Out of this all is gradually coming the realization that our field is infinitely larger than we ever dreamed it to be, and with this knowledge comes our sense of greater and graver responsibility. It automatically enlarges the potential possibilities and suggests likewise a different character of limitations. To me, as I have said before, the limitations bespeak the possibilities. Therefore, I have dwelt upon them. I do not wish to be misunderstood and accredited with a purely destructive philosophy in this connection, for such is not my intention. It is because I am tremendously proud of our profession that I am becoming more critical of it. It is because of my failures to accomplish my concepts of idealism that I am trying to find more and more reasons for things pertaining to our work. We cannot relegate all failures in results to misapplied mechanical therapy. Nor are we justified in assuming that mechanical therapy is equal to all the tasks we impose upon it. As Johnson aptly puts it: "Other phenomena must be taken into consideration; the possibilities and limitations imposed by the growth impulse inherent in the tissues, the influences of the endocrines and all other basic factors of metabolism upon developmental processes."

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# WHAT ARE THE POSSIBILITIES AND LIMITATIONS OF ORTHODONTIC TREATMENT?*

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JUDGING solely by the theories on etiology, treatment and prognosis that have been presented by members of this Society at previous sessions, one is led to believe that considerable difference of opinions exists. Such differences are excellent signs that we may progress, that the field of probabilities is vast, and that much progress is possible before we reach our limitations.

"Diagnosis" according to Webster means "to ascertain," and according to the same authority "ascertain" means "to make certain." However, Mark Twain's reference to New England weather aptly applies very frequently to us when he stated "that the most certain thing about New England weather was the uncertainty of it."

Any suggestions that I may offer are necessarily based on a very limited experience, and limitations of treatment can therefore naturally be classified under the heading of "failures." Mechanical application of force is a necessary vehicle of our efforts, being frequently the idol at which we worship; it therefore has reached a high state of perfection. I should not charge but a small percentage of failures to that cause.

Failure to gain the desired cooperation might add a slightly larger percentage of failures, but I feel very confident that the majority of failures in my own practice at least, is in not knowing what it is all about.

Let us for an example take an average group from any orthodontic practice. What do we find? Overweight, underweight, tall and short patients, all with variations of temperaments, habits, environments, diets, variations in growth, and each has an inherent growth and developmental force peculiar unto itself and is in some degree influenced by many assisting and conflicting impulses. It must needs be an optimistic orthodontist who accepts full responsibility for success and predicts fulfillment of his desires through any prescribed treatment.

Do I really believe that with a squint-eye examination, plaster casts, gnathostatic or otherwise, a profilograph, geometric, photostatic and metabolistic survey, dental and general skeletal radiographs, and any method of arch predetermination, that I can make certain as to the results from orthodontic treatment under my direction?

Experience teaches me that the time to take the parents and patient into my confidence is before and not after treatment. I may be the only one who is blessed with consulting mothers making inquiry "About how much longer will it take?" You have great reason to be truly thankful if I am the only one so unfortunate. Mental telepathy tells me I am not alone. After the tenth explanation I find I am the only one to blame.

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My mystic prognosis would probably have a more secure foundation if I advised prospective patients "before treatment" that about 98 per cent of the desired improvement depends upon the part Nature will play, that the inherent possibilities are less certain than the present political forecast, that the dental apparatus is only our local field of operations, and it is decidedly dependent upon the whole organism.

Have I previously told the inquiring parent that an abnormally breathing child of the age of twelve years will possibly never breathe completely normally? That unless we establish approximately normal breathing we may expect a partial failure? Have I told her of the improbability of gaining any correction of the extremely high vault after that age? Have I told her that a record made of unilateral distoclusions shows that the apparently normal side is the side used for mastication? Have I stated that while we confidently expect to gain changes in the supporting tissues through tooth movement, such changes depend upon the inherent possibilities present in any case? And the catch to the phenomena of the proposed desired changes is that the teeth and supporting tissues do not stay put after we stop tinkering with them unless normal function is established.

To be perfectly fair the majority of us must admit that we are faddists. We are prone to accept as a proved fact, regardless of the source, every statement made; and we frequently change, with the seasons, many of our beliefs of theory and practice.

Some scorn the idea that a lack of arch width and failure of spacing of the deciduous incisors are symptoms of approaching malocclusion. We frequently note in the literature the positive statement that such habits as thumb-sucking do not in any way affect the arch form, and within the past year I have read statistics which tended to prove that normal arch development and occlusion occur in conjunction with abnormal breathing. Some equally surprising statements rather indefinitely supported by facts, have been made regarding the ill effects of posture habits.

I sincerely hope I have a receptive mind regarding information about our daily problems, at least like the drinking Scotchman "I will take any given amount." Personally I believe in miracles, otherwise I should not make such glowing promises to my prospective patients. However, I am not yet ready to swallow or be swallowed by the whale. I am as yet far from convinced that Nature intended man to walk upright. Observation tends to teach me that the nose has functions other than being the location of the sense smell. I am convinced that Nature's main idea in providing us with teeth was to provide us with a means to masticate our food, and I note that when the teeth, both deciduous and permanent, are so used properly Nature more willingly lends aid in growth and development to the supporting tissues.

Casual observation of various other forms of animal life show apparently normal dental apparatus. Posture habits apparently do not affect arch development with Fido, even though he uses his paws as a pillow. But our pets do suffer from dental diseases when forced to subsist on a premasticated diet and in an environment abnormal to them. Spacing of the deciduous incisors does not always occur. If we set a definite age and demand spacing by age alone, we should be decidedly in error. A condition that would be apparently normal for

one child would be decidedly abnormal for another child at the same age. Failure of deciduous incisors to space at the time I may think it necessary, may or may not indicate treatment. The desired phenomenon is not solely caused through proper use of the deciduous apparatus. Normal use is probably only one of the many stimulating impulses. Spacing is naturally very dependent on osseous growth, and osseous growth is certainly a varied and complicated procedure. Lack of arch growth usually shows like conditions generally. When I attempt to standardize symptoms or base conclusions on a summary of statistics only, assuredly I am going to fail. If it is of no other benefit, lack of spacing suggests additional research. Lack of spacing and arch growth apparently go hand in hand with abnormal breathing, and while I do not know positively, observation indicates that Nature intended that an adequate oxygen supply, normally obtained, is as vitally necessary to a growing individual as a balanced food intake.

It is as reasonable to believe that we can control and design individual height, width, and weight, as to believe that we can be dictators of arch predetermination. Any unproved theory may be helpful, even if in reality it only stimulates hope, but we are accepting a rather large field of endeavor for experimenting on an improvement of Nature's plan if we place absolute reliance on dimensional data. We must not overlook the fact that in the ideal, Nature has a very indefinite control called harmony. It would be reasonable to assume that one would unthoughtedly attain likeness in arch shape and form in all cases treated rather than the necessary individual normal. This error is apparent when we speak so positively of the ideal arch form. It is not practical to build two-by-four houses on four-by-four foundations, or vice versa.

Through lack of ability and as our literature is profuse on the subject of diet, it is not necessary for me to attempt to point out the value of a properly balanced diet. Wholesome and nourishing foods are usually available to all or at least a majority of the patients under our care. The modern mother is rather well informed on the subject, with the probability of being too specialized. In the hunt for the correct ratio of calories the illusive vitamins and the chemical and elemental content, the proper method of obtaining them is overlooked or neglected.

Nature does a pretty good job of furnishing the proper food necessary for life, growth and development, but she should not be censored because we degerminize or devitalize it, or let palatability or taste supplant common sense.

Our present limitation and the future possibility of proper treatment are decidedly dependent upon an increased knowledge of the cause and effects of an embalance of the internal secretions. Fifty per cent of our patients apparently show an embalance; sometimes I am convinced that 100 per cent would be a more nearly correct figure. As a matter of fact, owing to our lack of definite knowledge, we may be perfectly safe in assuming that we all come under that classification, rather a general classification of *non compos mentis,* as attempted denial only proves the assertion.

Until otherwise disproved it is apparent that evidence of embalance is present in all known classifications. Certain types of open-bites account for only a small percentage of the noticeable cases. The majority of us are prone to follow the path of least resistance and to neglect to observe symptoms that may be helpful in solving these problems.

Delayed partial or complete stasis of erupting teeth frequently associated with excessive osseous growth, temperamental tendencies, as they apply to certain nervous habits, and to argumentative, combative and agreeable dispositions, are only a few of the many avenues for record and study that are the result of at present unknown stimuli. Normal balance or function of the internal secretions is only one of the vitally necessary factors that partially direct, control, and supervise the formation and foundation of the dental apparatus, associated and supporting structures, and the whole unit as well. Statistics of the authorities are so conflicting, are based on such limited research, that confusion or lack of certainty is the rule. A solution that may be of benefit to us depends upon our individual efforts to assist. Our profession has an opportunity equal with that of any other to make some progress along this line, and to prove or disprove certain theories will be decidedly more beneficial than to improve the skillful application of any mechanical device.

In all the fields of medical endeavor, prevention is preferable to cure. Without any thought of advocating early treatment generally, the possibilities of future treatment are decidedly improved if we at least avail ourselves of early observation. A majority of the cases referred to us are in a very advanced stage of malocclusion. In this we are greatly to blame. Generally speaking, the orthodontic papers presented before the state, district, and local dental societies usually paint a glowing picture of the simplicity of treatment, with marvelous results obtained one month after removal of the appliances. We do not stress practical prevention. Dentistry for children has made rapid progress, but as yet more time and effort are expended in treating effects rather than the cause; the relief of pain rather than the prevention. This is exactly the all time policy of dentistry for adults. It naturally follows that the majority of cases under orthodontic treatment are in an advanced stage of malocclusion before corrective measures are applied. To extend the scope of the possibilities of treatment, it will be necessary to enlist greater cooperation from our fellow dentists.

A vast majority of general practitioners overlook a real opportunity for service and a great financial return in having an apparent dislike for dentistry for children because a practical plan is not generally followed. In the average practice 90 per cent of the work for children is attempted when the child is in pain, and emergency cases always arrive at the least desirable time. I suspect most of us have a vivid recollection of our first visit to the family dentist. Dentistry for children has been stressed, but its real value and importance have not as yet been properly appreciated. At least the proper approach to the patient has been neglected. If the dental profession really believed that the deciduous denture is of equal value to the individual as is the permanent denture, this difficulty would have long ago been overcome. The place for the little patient to learn about the dentist is in the dental office, not through scare stories about the Bogy-man, and the first visit to the family dentist should be made during the arrival of, or, at the very latest, upon completion of, the deciduous denture. These visits the first few years require but a few minutes' time, and the only necessary requirement for success is that the family dentist be agreeable. A dental examination is not even attempted until the third or fourth visit. The family dentist is only attempting to show his prospective patient that a visit

to him is a real event, that above all it is agreeable, and of course later, that it is important. The time spent the first few visits will be repaid many fold in time saved in later years, and it will be the very exceptional case with which any difficulty will arise in securing radiographs and giving necessary dental prophylaxis several times before the patient is four years of age. To permit normal charges one must arrange regularity of visits. If parents are told to return in a few months, this frequently means years. A card system must be utilized.

Not as a digression from the subject but as an aid in extending the field of possibilities, may I mention that a very definite practical method toward insuring prevention and a willing return of the patient at stated intervals, is fully outlined in the November, 1931, issue of *Oral Hygiene,* pages 920-924. While designed for adult patients, the method is especially applicable to the preschool age children. Ultraconservatives may for the sake of argument, or false imaginary beliefs of ethical methods, or misplaced professional dignity, find this suggested prevention method objectionable. We all sanction the belief that all accredited professions of the healing arts should endeavor as far as it is economically possible to do the greatest good for the greatest number, feeling confident that the financial return will be equal to the effort expended. Present conditions impress the need of a more comprehensive understanding of the economic problem.

The public has been the loser in the past and will continue to be so in the future because of the failure of our profession to make a united effort to teach properly, which is our first duty, and to present properly plans for better dental health conditions. As we continue to neglect our duty, other often objectionable and frequently incorrect advice is presented to the public. Increasing our knowledge and improving our ability to protect and improve the public health merit us a livelihood comparable to the good we do. Until a united effort is made, any ethical individual effort that really attains results is certainly praiseworthy.

The plan to which I have referred certainly merits the attention of our brother dentists, and is decidedly of more value to the public than many of the accepted high pressure business methods now employed, and while the patients profit most, the family dentist is being well paid for his efforts. The overhead incident to the increased volume is amply provided for in that cavities will be noted before pain indicates their presence and before approximal contacts are lost. Incorrect occlusions will be noted when they should be, missing teeth, supernumerary teeth, or other anomalies will be recognized early. Deciduous teeth being under radiographic examination will be removed in the proper sequence and not by guess method. Any occlusion defect will be called to the attention of the orthodontist, and last but not least a larger percentage of mouths will be placed in a healthy condition, tending to permit a greater number to function normally, which will tend to promote a greater number to grow and develop normally without mechanical aid.

I am certainly not advocating that the family dentist become a nurse maid to our prospective patients, or that he devote his time to eulogizing our efforts, but rather the utilizing of his unoccupied and unproductive hours and receive therefor a financial return that will equal that received for any other dental service rendered. He will have the added satisfaction of knowing that the real value of the service rendered for prevention cannot correctly be estimated.

The above suggestions have been stated unnumbered times, and the real value of prevention through dentistry for children is at present being given a major share of the pages of our journals. It is apparent that real prevention has only reached the advisory stage, considerable oratory with little effort expended toward end-results. The problem and its solution are simple, hence the neglect. The dental profession poses as being greatly concerned and alarmed over the dental health of and proper services for the masses, but through practice apparently considers that all gold removables, and celluloid dentures, with fancy nom de plumes, the last word in dental service.

With even a partial application of the above suggestions, your practice and mine will consist of patients who after having been under observation one, five, or ten years, will not be total strangers to us. We shall be aware of many anomalies possibly several years before treatment is necessary, and can plan treatment accordingly. We shall probably have few patients that have been abnormal breathers for some ten years before consulting us. Intermaxillary elastics may not be such a necessary aid, and there is an added possibility that we should all have a smaller percentage of partial or complete failures. At least a majority of the patients under treatment will really practice oral hygiene, principally because they have been taught and have acquired this really desirable habit at the proper age.

Lack of cooperation from both the patient and the parents is a real problem that confronts us daily. It is natural to neglect or to avoid intentionally a discussion of the various phases, difficulties and probabilities of treatment with the parent, in the belief that the parent does not understand or does not care to have such an explanation made. This is debatable. It is the only method I know of that will impress upon the patient and the parent that the major responsibility is theirs. The periodic report card first suggested by Dr. H. K. Cooper of Lancaster, Pa., is a real aid. Receiving good reports is really appreciated by both the patient and the parents who do cooperate properly because it shows that you appreciate their efforts, and the duplicate copies placed on file are exceedingly helpful should it be necessary in the future to discuss lack of cooperation with the parents. Since first used, the report card has been continually improved until at present it covers a record of appointments, all instructions as to appliances, and care of the mouth. Filling in the patient's name is the only writing necessary, as a check mark indicates the items that you desire to call to their attention. The cards may be filled in by your secretary without her consulting you. Such a method certainly increases the possibilities of securing greater cooperation.

I admit that it is difficult to be frank with a prospective patient (especially at the present time) in explaining that successful end-results depend to a certain unknown extent upon the factors over which we may have very little or no control. Yet some explanation is due the patient unless we desire that he believe that proper treatment is simply a miracle method of shifting teeth around to suit our fancy.

One's explanation of the methods and the time required by Nature to produce an individual normal arch is decidedly handicapped when the parent advises that other more proficient practitioners complete cases in a few months, employ

secretly known systems, and offer guarantees which compare favorably with the gold shell crown period.

If the practice of orthodontia progresses equally in all localities, if it reaches the position to which it is entitled, our approach to the public and to our brother dentist must cover a wider scope than an exhibition of tooth movement. We cannot in fairness censor the general practitioner when we read in some of our better dental journals an article on treatment of some type or malocclusion by some one who through experience and ability is qualified to offer an opinion, then to find in the same journal, an illustrated "before and after" advertisement that reads as follows:

"Each set of casts sent us for consultation is carefully examined by our advisory staff. Our advice is based upon the known adaptability of our appliance to that case, and upon its proved performance in the hands of the average dentist, as shown by many years' time and hundreds of cases."

"Capable orthodontia technicians entrusted with the construction of your appliance enable you to practice economy and increase your producing hours. Just send us a rough design of your requirements together with full models and bite and any case history available. Your instructions will receive the most careful attention."

"In fact so delicate and active is our system that it continues a stimulating effect for many weeks after a change of its form. Cell function of the alveolar process and readjustment of the vascular and lymph systems are permitted to become fully established, thus the moved teeth are PERMANENTLY set in the new position. Any tooth movement is possible with our arch; buccal, labial, and lingual movements of the teeth, a rotation of a tooth directly on its axis, rotation in the form of buccal or lingual movement of one side of a tooth with little or no effect on the opposite side, elongation or depression, root positions changed, molar roots moved, movement of incisors, en masse, mesial or distal movement of crowns in a surprisingly short period of time, in the most difficult cases with our system."

The truth in advertising is being exercised a bit, offering such advice and attempting to do some of the things that are impossible under the most favorable circumstances, with any appliance or miracle system, be it automatic, double action, linguals, labials, removable, gold plated, blue ribbon, edgewise, splitplate, Tom, Dick and Harry's special systems or just plain old "Pull 'em and watch 'em wander."

Our general practitioners should not be too quickly ridiculed because they are supporting and depending upon laboratory orthodontic diagnosis and C. O. D. parcel post appliances when our best journals tell them in very positive, illustrated language that opportunity is knocking. I frankly admit that I have been equally as gullible about some things I have read in the papers and after due trial and tribulation have found out through experience that while Nature will accept help, she is very positive how and when she takes it.

The possibilities and limitations of orthodontic treatment are additionally handicapped, and the value and progress of orthodontic services are certainly not improved in this manner.

Assuredly, I believe that the orthodontic services rendered today compare favorably with any other dental service, and that it is truly the exceptional case

of malocclusion that cannot be improved to some extent through proper treatment. But should I guarantee results on a definite schedule, knowing that Nature requires an indefinite time and an individual method to make compensating alterations, or should I lead patients to believe that progress depends solely upon my skillful manipulation of a mechanical apparatus, aided perchance by a few shots of ultra-violet ray? Then certainly I am not a believer that a child has periods of growth, and periods of apparent growth stasis.

If the fulfillment of my prophecy depends solely upon positive tooth control only, then let us hope that I fail to deliver on schedule. If growing, living tissue is to be governed by and made to fit preordained measurements, or if the size of my bank account gives the only record of the degree of success gained in orthodontia, then will I assuredly have to confess that it is all a failure.

## DISCUSSION OF SYMPOSIUM "WHAT ARE THE POSSIBILITIES AND LIMITATIONS OF ORTHODONTIC TREATMENT?" BY DR. EBY, DR. DEVRIES AND DR. SPENCER

*Dr. G. W. Grievc, Toronto, Ontario.*—I didn't want to be the first to take up this discussion, but as a subject in which I have been much interested has been presented by Dr. DeVries, I thought I should like to have the opportunity of saying just a few words.

Dr. Eby showed several interesting cases in which he advocated no treatment. In one of these the maxillary central incisors were broken. These teeth, I believe, were too far forward and, as you will remember, were rotated so that their mesial corners projected. Many children meet with a similar mishap when they stub their toe. I believe that in cases like this where the teeth are projecting, we should at least correct this condition and avoid such a fracture.

Dr. DeVries quoted from a paper of mine, in which I said that "teeth ordinarily do not occupy positions distal to normal in relation to the bone in which they are placed," and he spoke of the qualification "ordinarily."

What I mean is that there may be conditions where, through mutilation or some interference, we may have some teeth which might possibly be held back beyond the normal position, but I think that is very rare. I mean, in the ordinary course of events, teeth do not occupy positions distal to normal in relation to the apical base. Malocclusion, I believe, is the result of a forward drift of the teeth. Dr. Sim Wallace of London is also very strongly of this opinion. In discussing this problem with some of the outstanding men in Europe last year, I found that they, too, take this view of it. I am not going to take up your time here to discuss this, except to suggest that you look up some of my papers in the literature where I have covered this subject quite fully, and I would ask you to read, when they come into print, the papers which I presented at London and Paris last year. You will thus understand more fully the importance of this problem which Dr. DeVries has brought before us in his paper.

I appreciate very much the fact that Dr. DeVries, a man who has had a vast amount of experience, has taken up this subject, in which for some years I have been trying very hard to interest the members of our profession, either to prove that I am wrong or to confirm my findings.

Dr. DeVries spoke of the limits of obtaining growth in the mandible, particularly in a vertical direction. A certain type of individual is very short in the lower third of the face, and the main body of the mandible is shallow. Many of these present a malocclusion in the second division of Class II, as well as in Class I (Angle). I cannot yet prove it, but I believe strongly with Dr. DeVries that we cannot increase the vertical growth in these cases. It would be a very desirable accomplishment, if possible; but, while a certain amount of vertical growth in these cases might be obtained, I feel that this growth cannot be retained.

As far as the horizontal growth of the mandible is concerned, we can obtain all we require by proper stimulation of Nature. This problem I have covered fully in some of my papers.

I don't remember exactly how Dr. Spencer put the point, but I happened to catch him saying something to the effect that you cannot build upon a two-by-four foundation; I did not hear the beginning. A building, constructed upon too small a foundation, will not stand. In

a number of the casts which we saw upon the screen today, the teeth, both maxillary and mandibular, had all drifted forward. In the treatment of these cases, particularly in Class II, if we apply intermaxillary elastics, the mandibular teeth are carried still farther forward, and the maxillary teeth are not brought back into normal relation with the cranium. Growth in the main body of the mandible is, therefore, not obtained. If there are a short mandible and protruded maxillary teeth, we have an illustration of the two-by-four foundation with too large a superstructure, and more or less failure is sure to result.

*Dr. Suggett.*—I shall speak of only one phase of Dr. Eby's excellent paper and that is the possibilities of orthodontics.

The more I investigate orthodontics, the greater the possibilities I find and the fewer the limitations.

Not that I believe that we can perform miracles.

What could be more interesting to an orthodontist than to undertake some of these so-called impossible cases, or to speak more accurately, these extreme types of malocclusion.

The first step is to take gnathostatic models and photostatic and x-ray pictures. With this data it is possible to make a differential diagnosis and record it. Take measurements and chart the curves so you can express the condition mathematically.

When you record your findings in this manner, you will reveal conditions that the ordinary models of the gay nineties did not show.

Having thus a diagnosis that really shows you what is there, you will understand what is to be done and can proceed intelligently and scientifically to do it.

You can proceed scientifically because you will know before you start just what the deviation is from the three planes of the head, the raphe-median, the horizontal, the orbital.

Some of these extreme cases are a challenge hard to resist, and I for one could not. I undertook quite a variety of cleft palate and harelip cases, and an extreme open-bite and an extreme mesial overbite case, a case of extreme mandibular protraction and a number of other types not so unusual.

One patient, aged sixty years, with impacted canine.

They all yielded to treatment about as the usual case does. No damage resulted even in the open-bite case where all the teeth back to and including the first molars, were moved sufficiently to close an incisal infraclusion of almost an inch. Frequent x-ray pictures revealed no damage.

In the overbite case the mandibular incisors were depressed 1 cm.

The case of mandibular protraction was corrected by Dr. George Hensel, a very clever surgeon, who resected both sides of the ascending ramus, and then I moved the ramus back into the correct position and laced the two jaws together by means of bands and hooks which I had previously placed.

The union was perfect, and all bands were removed in about six weeks. This case will be reported by Dr. Hensel in the medical journals in the near future.

I would urge young orthodontists who have had good training to undertake all these cases that come to hand. They may need help and advice, but there is always some one who likes hard jobs even without pay, who would be delighted to be in on it.

One or two such cases successfully treated would make a reputation for any young man. It will develop interest, skill and contacts that will be highly worth while.

Here is a great field for research right along the line that we are practicing, the results of which are beyond estimating, and the young orthodontist should eagerly seize the opportunity to undertake these interesting cases.

# IDENTIFICATION BY PROOF OF INHERITED JAWS OF TWO CHILDREN EXCHANGED AFTER BIRTH*

DR. MED. ALBERT KADNER, HAMBURG, GERMANY

IN 1922 before the European Orthodontological Society I read a paper on the etiology of the anomalies of the teeth, in which I presented the results of researches I had then been making into the law of heredity in so far as it bore upon etiology and its general influence upon cases. I was encouraged to continue my researches, and now I know that the painstaking and laborious work since 1922 has not been in vain. My most optimistic anticipations have been realized by the carefully accumulated evidence.

As a result of my investigations I found that the rules of heredity can also be applied to the various parts of the framework of the body, and I later explained my theories more fully in the paper on "The Problem of Heredity of Anomalies of the Jaws and Teeth."

In 1922 I stated that "this law of heredity will soon become of considerable value in criminal science and practice;" for instance, a Solomonic case is before the court: two couples claim the same child as their own, a question that has frequently arisen in the past, and then I explained my way of solving this rather awkward dilema.

Now I wish to give, very briefly, the proof of this example and to show that my investigations have yielded positive results.

In the *Kölnische Illustrierte Zeitung,* an illustrated newspaper of Cologne, one day I read an appeal for Solomon to come forward and decide a question which perplexed and puzzled the learned in law and science. Though I did not particularly like the idea of sitting on a throne, especially in these days, I offered to place myself in the position of old King Solomon.

On October 24, 1919, two women, Mrs. D. and Mrs. B., were in a lying-in hospital in Gladbach, a town of the Rhineland Department. Their newborn boys had been taken into another bedroom for the night. Mrs. D. saw her boy immediately after birth and had definitely fixed in her mind some characteristics of his body. Mrs. B., on the other hand, did not see her child immediately after birth. Next morning, when the babies were presented to their mothers, Mrs. D. exclaimed at once: "This is not my boy, he is very different looking." All her remonstrances to the board of directors of the lying-in hospital, however, were in vain; they simply maintained that an exchange was absolutely out of the question. The mother was never convinced, and the older the boy grew, the more she doubted that he was her own child, because the boy grew more and more to be like the members of family B., whereas the boy of the other woman year by year developed more and more the characteristics of her own family. Whenever she met the other child her heart seemed to yearn

*Paper presented at the Second International Orthodontic Congress, London, July, 1931.

for him. Her grief increased more and more, and she demanded justice. The court asked a prominent medical authority to find out the father by examination of the blood. The blood examination failed because both families belonged to the same blood group. The situation was critical. Legislators, judges, and

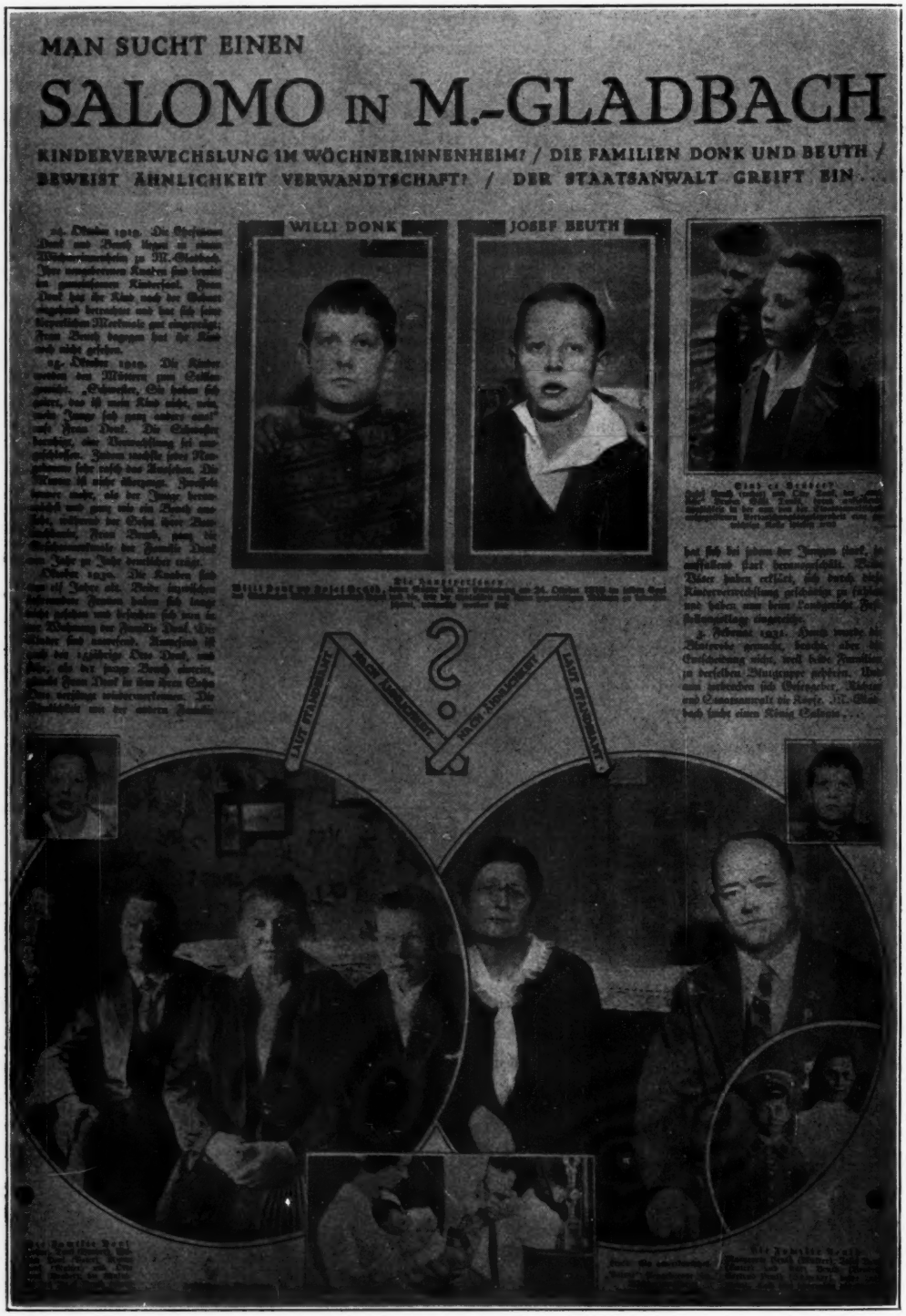

MAN SUCHT EINEN
SALOMO IN M.-GLADBACH
KINDERVERWECHSLUNG IM WÖCHNERINNENHEIM? / DIE FAMILIEN DONK UND BEUTH / BEWEIST ÄHNLICHKEIT VERWANDTSCHAFT? / DER STAATSANWALT GREIFT EIN . . .
WILLI DONK
JOSEF BEUTH
LAUT STAATSANWALT
KEIN ÄHNLICHKEIT
KEIN ÄHNLICHKEIT
LAUT STAATSANWALT

**Fig. 1.—The appeal which appeared in the newspaper, showing the two families.**

public prosecutors were at their wit's end. They called for King Solomon. I very carefully considered the problem, and the following report is the result of my investigations.

The question to be decided by scientific methods was, Were the babies exchanged? The blood test failed. There only remained the method of comparing the bodily conformities. In saying this I make a difference between congruity and similarity. Generally speaking, similarity proves descent from the same family stock, but the law requires further proof and stronger evidence than similarity. Seeing Mr. B., the father, standing beside the presumed son of the other family, you would say at once, "These are father and son!" So did I when I met them in a group of about thirty persons. So said the whole court of justice when both families were standing before the court. The other boy, Joseph B., shows striking similarities with members of family D.

How are these similarities brought about? They originate from the fact that each separate part of the bodily structure is inherited from either one or

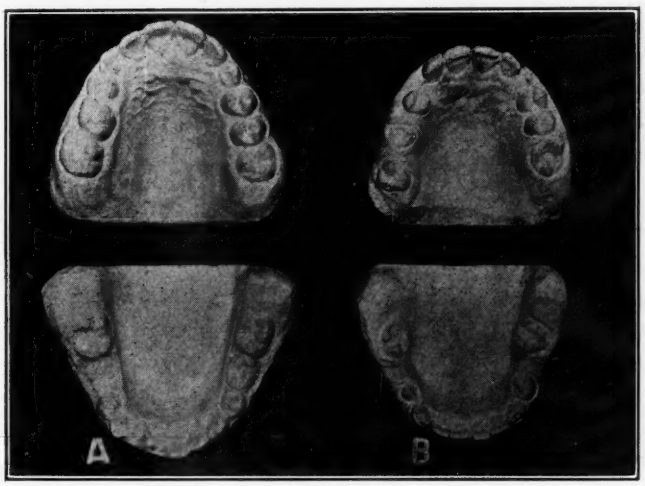



Fig. 2.—Casts of jaws of the boys: *A*, Joseph B.; *B*, Willi D.

the other of the parents. Each separate component of the body structure is, broadly speaking, identical with the corresponding part of the parent body, subject of course to certain modifications and alterations, to which I shall refer later. The larger the number of parts inherited from one parent the more the child will be like this parent. A child may therefore appear like the father in some parts, in other parts like the mother. Sometimes one even seems to recognize features of the grandfather or grandmother in the child.

The law of heredity sometimes produces the most grotesque formations, as for instance a small nose in a big face, or a long, aquiline nose in a small face. Very often the middle part of the upper lip is very short because this part, the so-called philtrum, may originate from a different parent germ cell than the lateral part. Other investigators have found the same to apply to the formation of the nose at the tip, the dorsum and the sides. In the formation of the jaw the same laws of heredity are traceable in the lateral parts of the maxilla and mandible, the intermaxillary bone, and the whole formation of the teeth, includ-

ing their alveolar bone, and perhaps also the other parts of the jaw bone, as for instance the vomer and the os palatinum. The bony parts of the body can be measured and retain their characteristics. These facts any scientist can easily verify for himself.

In regard to the freak formations caused by the law of heredity, the build of the jaw frequently offers striking examples. A child will inherit jaw bones from one parent and teeth from the other, resulting in either crowded, overlapping teeth because jaw bones are too small or diastemata because the jaw bones are too large for the small narrow teeth.

Of course, exterior influences may disturb the inherited characteristics, but we are able to determine those disturbing influences by comparing the separate parts within the families. We find that the same diseases always produce the same anomalies. The medical profession terms this an inherited predisposition to some particular disease. An anomaly of formation may gradually become less and less distinct and may disappear in time. It is the tendency of nature to eliminate such anomalies and to return to the normal.

Now returning to the case in question, we find not only the outward appearance of family likeness supporting the theory of an exchange having taken place, but a most striking confirmation of my theory that the inherited parts in children of a family must correspond within a fraction of a millimeter to the corresponding parts of the parent.

The technical method I adopted for my investigations does not present great difficulties. Models of the jaws of the families were made and measured. To get the same base on the models I put them in a frame, fixing the line of the molar points and placing the bite plane on a glass plate. Thereby I obtained an equal base plate for all models. It is necessary to do this in order to get the photographs always from the same angle. For measuring I chose those points which are in current use. This means always the same point of the molars, premolars, and canines. If the respective teeth are allowed to cut through into their natural position, these points mark the middle of the alveolar bone. When a tooth is missing, I place the point of the calipers on the middle of the alveolar bone and get the same number of millimeters as when the respective tooth is in its place. The measurements of the jaws of both families are given in Table I.

Fig. 3 shows twenty-four models, twelve maxillary and twelve mandibular. No. 1 is a set of casts of the father's jaws, No. 2 of the mother's jaws of family D., Nos. 7, 8, 9, and 10 are of their children. No. 5 is a set of models of the father of family B., No. 6 of the mother, and Nos. 11 and 12 of their children. Nos. 3 and 4 are models of the two children in dispute.

The measurements and the pictures show that the width of the jaws of these two boys (Nos. 3 and 4) is very different one from the other. On the other hand, we find lateral parts of the maxilla and of the mandible of two sons of family D. (Nos. 9 and 10) correspond in size exactly to those of the father (No. 1); whereas the measurements of these of another son (No. 7) and of the daughter (No. 8) are identical with those of the mother (No. 2). This might seem strange, but it has been scientifically ascertained that the growth in width ceases at the age of about four to six years, and then remains constant.

TABLE I. MEASUREMENTS OF JAWS AND TEETH OF DISPUTED BOYS OF FAMILIES D. AND B.

| | (3) WILLI D. | (4) JOSEPH B. | (1) MR. D. | (2) MRS. D. | (7) SON D. | (8) DAUGHTER D. | (9) SON D. | (10) SON D. | (6) MRS. B. | (11) DAUGHTER B. | (12) SON B. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Maxilla:* | | | | | | | | | | | |
| Breadth at second molars | — mm. | — mm. | 52 mm. | 56 mm. | 56 mm. | 55 mm. | 53 mm. | 53 mm. | — mm. | 53 mm. | 51 mm. |
| Breadth at first molars | 42 | 48.5 | 48 | 52 | 53 | 53 | 48.5 | 49 | 46 | 47 | 45 |
| Breadth at second premolars | 36 | 42.5 | 42 | 46 | 45 | 45 | 44 | 44 | 41 | 41 | 40 |
| Breadth at first premolars | 31 | 38 | 37 | 40 | 39 | 39 | 38 | 40 | 36 | 36 | 35 |
| Breadth at canines | — | 36 | 35 | 37 | 36 | 36 | 36 | 38.5 | 35 | 35 | 35.5 |
| *Mandible:* | | | | | | | | | | | |
| Breadth at second molars | — | — | 48 | 51 | 50 | 50 | — | 48 | 49 | 48 | 49 |
| Breadth at first molars | 37.5 | 43 | 43 | 46 | — | 46 | — | 48 | 43 | 42 | 42 |
| Breadth at second premolars | 33 | 43 | 38 | 41 | 41 | 42 | 37.5 | 38 | 36 | 34 | 35 |
| Breadth at first premolars | 29 | 33 | 32 | 36 | 36 | 36 | 33 | 33 | 30 | 29 | 30 |
| Breadth at canines | 26 | 28 | 26 | 27 | 27.5 | 27 | 28 | 28 | 25 | 25 | 25 |
| Breadth of intermaxillary part | 28 | 29.5 | 28.5 | 30 | 29.5 | 29 | 29 | 31 | 27 | 30 | 31 |
| Breadth of central incisors | 8 | 9 | — | 9 | 9 | 9.5 | 9 | 9 | 8 | 8.5 | 8.5 |
| Breadth of lateral incisors | 6.5 | 7 | — | 7 | 7 | 8 | 7 | 7 | 6.5 | 7 | 7 |

The frontal part of the maxilla, that is the part which is situated on the intermaxillary bone, of No. 10 is the same size as that of the mother (No. 2),

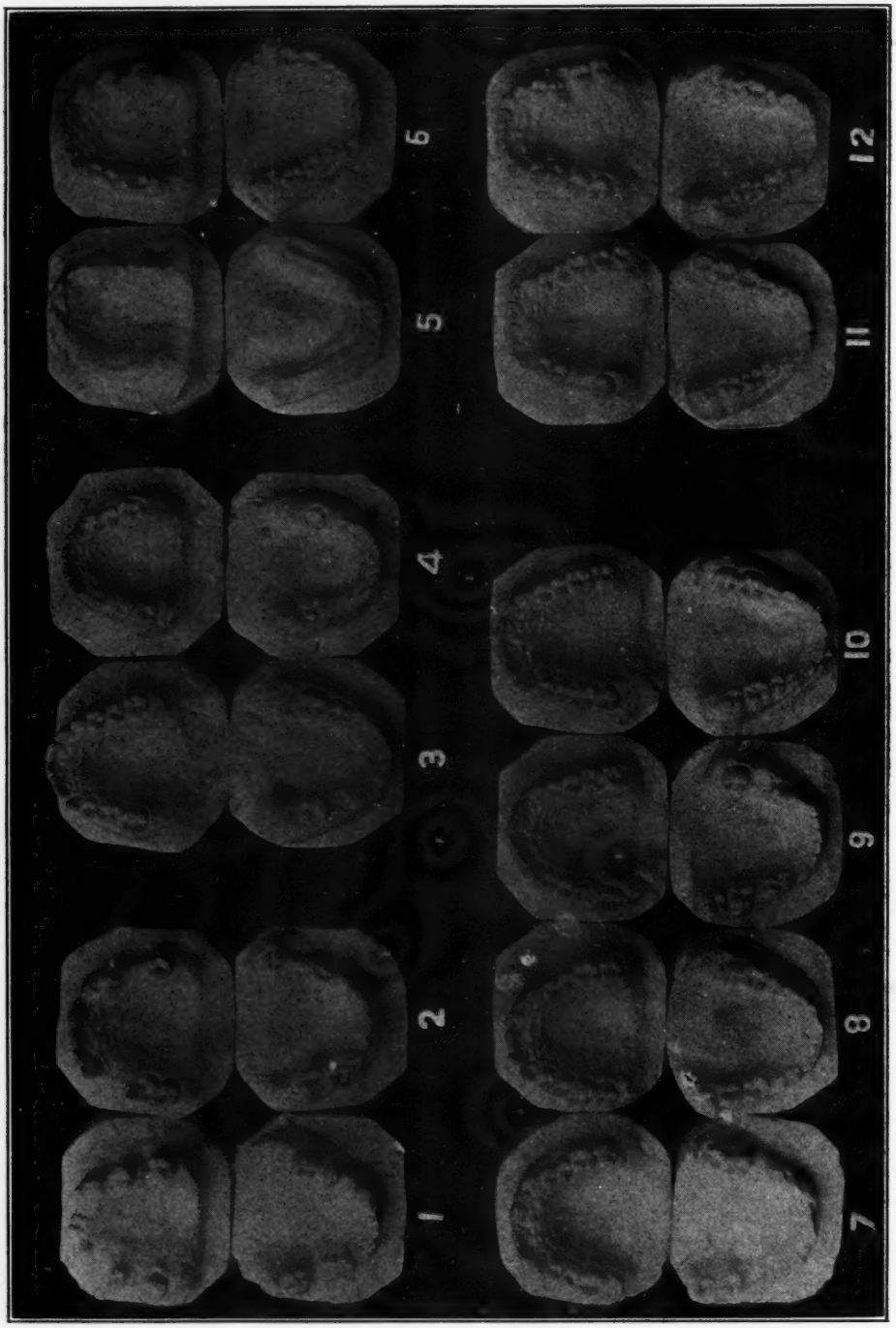



Fig. 3.—Casts of the jaws of the two families.

whereas the other children have the same form and width as that of the father (No. 1).

Comparing the measurements of this family with those of the disputed boys, we see that No. 4 has quite another jaw, whereas No. 3 has the same width

of jaw and the same form of the frontal part of the maxilla as No. 9, in fact the whole jaw of No. 3 is exactly the same in size and shape as that of No. 9 and has the same breadth as No. 1 (the father) and No. 10 (one brother). Now in regard to the middle part of the maxilla we find that Nos. 7, 8, and 9 are identical with the father (No. 1). No. 7 (the eldest son of family D.) and No. 8 (the daughter) show the same breadth of jaw as the mother (No. 2) but a smaller middle part, namely the same as the father, so that the teeth in this frontal part grew one over the other, a formation exactly alike in both persons. We call that disharmony. The jaws are so strikingly alike that, placing the points of calipers in corresponding parts of the different jaws, especially into the fissures of the teeth, we find the distance to be exactly the same.

In regard to family B., the father had lost all his teeth so that it was impossible to use measurements for our purpose as they are not sufficiently exact, but there are certain features which show striking similarity with one of the children in dispute. No. 4 has soft and defective teeth, but the teeth are the same in shape and size as No. 6 (mother of family B.). These teeth are extraordinarily narrow. Though this child is living in a family in which all members have very good, strong and well-formed teeth, he shows such weak and defective teeth that the conclusion almost forces itself upon one that he belongs to the other family stock.

As a result we find, therefore, that the disputed boy (No. 4) belongs according to the formation, size and growth of his jaws to family B. *He must therefore be a son of family B., and not of family D.; whereas No. 3, who shows identically the same formation, measurements and growth of jaw as the members of family D., must therefore be, as claimed by the mother of family D., her son.*

By this method it has, therefore, been clearly demonstrated that the boys must have been exchanged in the lying-in hospital.

It is the first time that our profession has had the opportunity to have a voice in such an important question. At the same time the theory which I am advancing is of the greatest importance and value for the science of heredity. It may, of course, not always be possible to have such striking proofs of family identity as in the present case. It is therefore necessary to take other conformities of the body, especially bodily anomalies, in further support of our proof for the family stock. In the present case my findings were further supported by the following facts: Mr. B. has a so-called pug nose. This nose he inherited from his father. The same form of nose we find in the face of his aunt and her son. The same kind of nose we find in No. 4, thereby furnishing an additional proof of his descent from family B. stock.

The blood test has been found to fail in most instances, but in my opinion a surer and more reliable test will be found to be at our service when the method which I have just very briefly demonstrated to you has been more fully investigated and further data have been collected by the joint efforts of all branches of the medical and biologic sciences.

I hope that in the interest of science you will supply me with any data bearing on this subject which may come to your knowledge.

# THE CHANGES IN THE FORM OF THE JAWS AND IN THE POSITION OF THE TEETH PRODUCED BY ACROMEGALY*

GUSTAV KORKHAUS, D.M.D., BONN, GERMANY

THE conception that a complete genetic explanation of malformations of the jaws must be of the greatest interest and importance to prophylaxis and its rational early treatment, has increased the interest in research work on etiology considerably in recent years. A great number of scientific investigators are at work trying to explain the origin of different orthodontic anomalies by a systematic disclosure of the effects of the normal and pathologic factors acting at different ages. By adding together their individual findings we are able to form a mosaic-like picture of the course of the anomalies. The good old scientific maxim that every assertion has to be proved by indisputable research material, is fortunately gaining ground in orthodontia.

Nevertheless, there are enough assertions in orthodontia lacking scientific proof. For instance, the theory of "endocrine disturbances" is greatly in favor, and these disturbances are made responsible for the different deformities of the jaws. As the function of the endocrine glands regulates the growth of the body, and thereby also the development of the jaws, so the conception has been put forth that only a disturbance of this glandular system is needed to bring about dental deformities. This statement is very convenient but very vulnerable, as it only displaces the principal point of the question and explains absolutely nothing. The truth of such a view is very improbable, as an endocrine disturbance must, as a matter of course, alter the entire growth of the body in a characteristic way, while the orthodontic pathologic cases represent more or less deformities and anomalies limited to the denture and the facial skeleton, and can be found almost in the same alarming frequency in healthy robust children as in those showing a disturbed bodily development.

As one of the main supports of the influence of endocrine disturbances for the cause of dental deformities, acromegaly is repeatedly mentioned. This is an interesting disease whereby through a tumor of the front lobe of the hypophysis the changes in the form of the jaws and in the position of the teeth are brought about under different serious general symptoms. The similarity of these changes with those of the orthodontic pathologic state of mandibular protrusion has led to the belief that they may have a common pathology, though possibly in a smaller number of cases. Thus some have classed certain forms of mandibular protrusion with a strongly developed mandible as "acromegalic mandibular protrusion" or as "Class III malocclusion caused by acromegaly," without having, however, proved any relationship with other symptoms of acromegaly in these cases.

*A paper presented at the Second International Orthodontic Congress, London, July, 1931.

After having stated these facts, the following questions should be carefully considered:

1. What changes in the form of the jaws and in the position of the teeth are found with acromegaly?

2. Are these changes in conformity with the orthodontic pathologic state of mandibular protrusion?

3. Can any connections be found between the typical symptoms of acromegaly and those of persons affected with mandibular protrusion?

## WHAT CHANGES IN THE FORM OF THE JAWS AND THE POSITION OF THE TEETH ARE FOUND IN ACROMEGALY?

As acromegaly was described for the first time in 1886, and also received its name at that time, the literature regarding this disease can be easily reviewed. It consists mostly of reports of individual cases, in which the description of

Fig. 1.—The experimental animal is on the right. Note the sinking of the spine between the shoulders, the enlargement of the head and tongue and the excessive wrinkling of the skin. (From Putnam, Benedict, and Teel.)

changes in the form of the jaws is given too little importance. The striking characteristic feature of acromegaly is the enlargement of the salient parts of the body, which leads to a pronounced disfigurement. I am obliged to omit a detailed description of this subject.

In the face, the nose is enlarged in all its dimensions. The strongly blubbered lips, the projecting superciliary and zygomatic arches, the prominence of the chin and often of the lower lip, represent the most pronounced changes and give the features a somewhat uncivilized and brutal appearance. The heavily developed and projecting mandible will, as in the case of a mandibular protrusion, overlap the maxilla and will destroy the correct occlusion which previously existed. In most cases a mandibular protrusion is mentioned as a typical symptom of acromegaly (Sternberg, Gadd, Heilborn, Klöppel, Blessing, Rost and Yale), and only one author (Thomas) reports a case in which the maxilla as well as the mandible was affected with a considerable growth in length and width, but in which no mandibular protrusion had developed. The alveolar process of the maxilla as well as of the mandible, showing considerable spaces between the teeth, advanced to such an extent that the lips could not be closed.

Before reporting my own material, I wish to call attention to some recent and notable work of American investigators, Putnam, Benedict and Teel. These

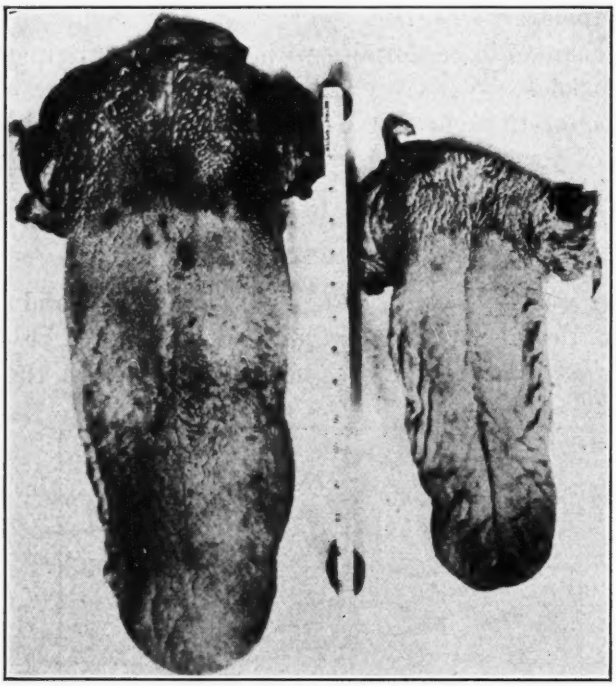
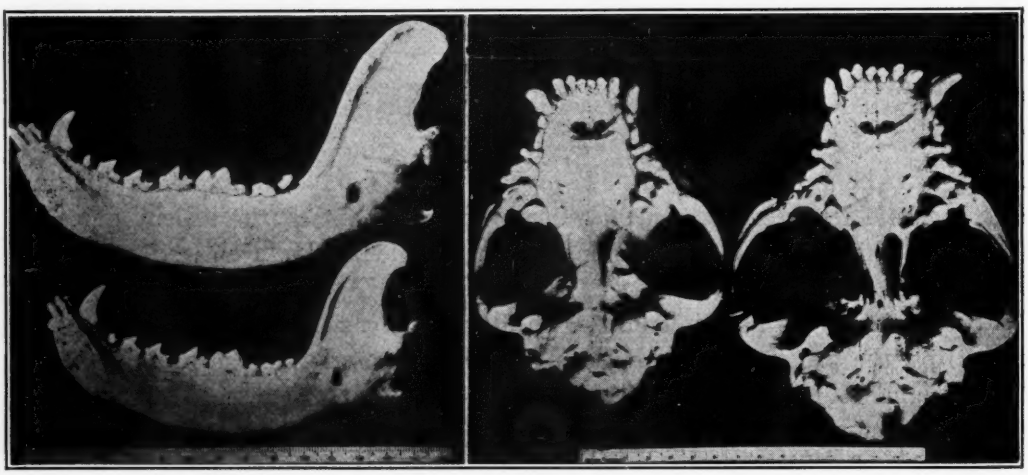


Fig. 2.—Tongues and tonsils. Experimental animal on the left, control on the right. Note the spreading apart of the papillae at the base in the larger specimen. (From Putnam, Benedict, and Teel.)



*A* *B*

Fig. 3.—*A*, Right half of the mandibles of the two dogs (inner aspect); the specimen from the treated animal (above) is larger and rougher and has enlarged processes and widely spaced teeth. *B*, Skulls. Note the asymmetry and wide separation of the teeth, the spread of the zygoma and the ruggedness of the base in the larger animal (right). (From Putnam, Benedict, and Teel.)

authors produced with injections a certain kind of acromegaly in dogs. They injected an extract of front lobe hypophysis. Before these experiments Evans and Long had observed, after similar injections, a tremendous growth in rats, but

with these changes the typical appearance of acromegaly was missing. Only after the production of a sterile and stable front lobe hypophysis extract the investigators, mentioned above, succeeded in obtaining the typical symptoms of acromegaly.

An unequivocal experiment was performed over a period of fourteen months on two English bulldogs of the same litter. While one of the puppies was left undisturbed as a control, the other one received intraperitoneal injections of front lobe hypophysis extract in daily increasing doses. The animals were four weeks old when the experiment began. After three weeks a more rapid growth could be observed in the treated dog. In the course of fourteen months, up to the time the animal was killed, the weight increased to 44 kg., while that of the control animal was, in comparison, only 23.5 kg. (Fig. 1). Finally the same exterior appearances and differences in the quality of structure of single organs could be observed as with acromegaly, i. e., a general enlargement of all parts, longer legs, larger skull, general weakness of the muscles, laziness, hypotrophy of the inner organs, especially of the ovaries, the uterus and the vagina. The tongue became so large that it could hardly be kept in the mouth, and saliva flowed continuously from the mouth (Fig. 2); the mandible as well as the maxilla showed, like the entire skull, an extraordinary enlargement and lengthening (Fig. 3); the teeth showed large interdental spaces between each other and were tilted outward by the pressure of the enlarged tongue. A mandibular protrusion was not specially developed, as this condition is normally characteristic of bulldogs.

## CASE REPORTS

By cooperating with the physicians of the medical policlinic of Bonn, I have been able to collect in the last few years six cases of acromegaly, and to investigate the changes of the position of the teeth and the form of the jaws.* I am very much indebted to the Privatdozenten Dr. Curtius and Dr. Marx, at present at the medical clinic of Heidelberg, for placing patients as well as their research material at my disposal, and I wish to express my sincerest thanks to these gentlemen. These cases were of the most various nature.

Case 1. P. F., male, first appearance of acromegaly in 1915. The patient was a soldier, twenty-five years of age, at the front and noticed a general increase in size. In eight months his weight had increased from 88 to 108 kg. (an increase of 20 kg.). His uniform was becoming too tight, and his boots were too small. The development continued constantly in the following years. The boots had to be made larger every year. Also, the arms and hands became massive, broad and heavy (Fig. 4) cutis and subcutis thickened distinctly.

The face, still showing harmonious features in 1915 (Fig. 5) became transformed into a coarse countenance. The mandible, previously in normal occlusion, advanced slowly into an extreme protrusion (Fig. 6). The libido sexualis had fallen into disuse in 1923, eight years after the beginning of the disease.

Radiographs of the skull showed besides the considerable enlargement of the sinus frontalis and the sinus maxillaris, an extraordinarily enlarged sella turcica

*The investigations were performed with the aid of "Notgemeinschaft der deutschen Wissenschaft" to whom I am greatly indebted.

with narrow clinoid processes. The hypophytic tumor caused a temporary pressure on the optic nerve, which, however, was cured after two x-ray treatments.

The superciliary and the supraorbital edges, the zygomatic arch and the external occipital protuberance are strongly prominent. The mandible is projecting massively and shows a strongly developed jaw structure, the ascending rami of which vault out in a distal shape; the angle of the mandible is flattened. The thick blubbered lower lip forms a step to the upper one; the chin is still further advanced in a massive way.

The models of this case show an extraordinarily large mandible, enlarged in all directions (Fig. 7*A*). The distobuccal cusps of the third molars are separated about 70 mm. from each other. The mandibular premolars and molars are displaced out of their usual lingually inclined position. Also, the maxillary premolars and molars of both sides, especially on the left side, show an outwardly inclined position, which proves that there was a force directed toward

Fig. 4.

Fig. 5.

Fig. 4.—Left hand of the patient P. F. in comparison with a normal hand.
Fig. 5.—Patient P. F. Photograph taken in 1915, when the patient was twenty-five years of age. The features are still harmonious.

the outside. Between the maxillary and mandibular incisors there are small spaces, which can be explained in the same way. A diastema is seen between the maxillary central incisors. Probably owing to secondary causes, the incisors became considerably longer in comparison with the occlusal plane, owing to their missing occlusion, so that the maxillary incisors are fully overlapped in the front view.

The occlusion of the molars shows on the left side, where the number of teeth is complete, a mesioclusion to the extent of two premolars (Fig. 7*B*). The mandibular protrusion caused thereby measures about 11 to 12 mm. from the labial side of the maxillary incisors to the labial side of the mandibular incisors. The maxillary first right molar is missing, but the extraction had taken place so late that a hindrance of growth of the maxilla, which could have favored the mandibular protrusion, had not set in. Only the second and the third molars have advanced into the space. In the mandible the spaces of the extracted molars on the right side are fully maintained.

On the different parts of the denture, distinct attritional surfaces can be ob-

served which were only possible with a normal occlusion. The mandibular incisors and the canines and the buccal cusp of the right premolar show striking attrition. The mandibular right premolar no longer touches the opposite teeth. These conditions confirm the statement that the maxillary incisors had a normal overbite in earlier life.

In summarizing, the following characteristics can be stated as consequences of the influence of acromegaly on the dental apparatus: an extraordinary en-

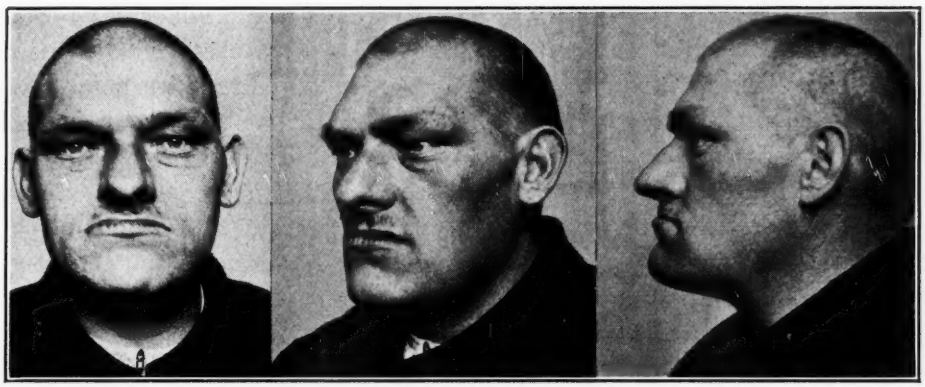
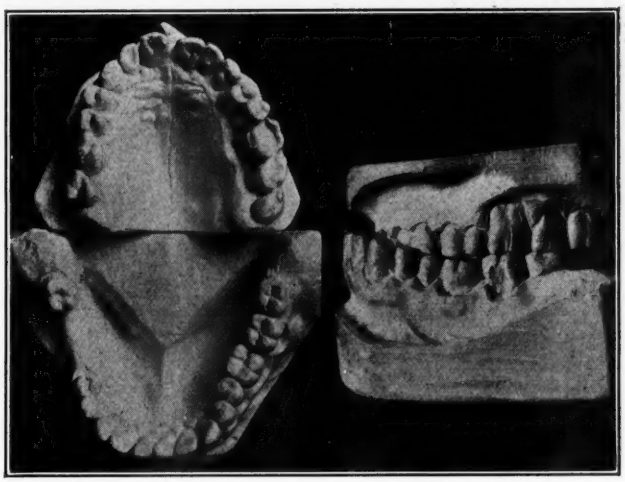


Fig. 6.—Patient P. F. Photographs taken in 1928. Note the remarkable changes in the face produced by acromegaly.



*A* *B*

Fig. 7.—*A*, Occlusal view of models of patient P. F.; *B*, Models in occlusion. Note change of occlusion: mesioclusion to the extent of two premolars, produced by acromegaly.

largement of the jaws, especially of the mandible, mandibular protrusion to the extent of two premolars, signs of displacement (tilting and small spaces) on all groups of teeth of the mandible as well as of the maxilla.

As the teeth of the left side, where there is a complete number of teeth, do not show any interdental spaces whatsoever between each other, and the projection of the chin and the alteration of the mandibular angle illustrate the extraordinary change in form which the mandible had to undergo, the mesioclusion and the mandibular protrusion could be explained by the increased growth in

length of the mandible at its joint, its angle and at its ascending rami. Besides, there are also partial individual movements of the teeth in the arch itself, caused by the pressure of the enlarged tongue. For the origin of the diastema, one could think of the growth of the median suture, but I found such a well-marked diastema only once in my cases of acromegaly.

Case 1 gives the true picture of a typical case of acromegaly; in Case 2, however, in spite of the extremely pronounced character of all symptoms of acromegaly, the changes in the denture were of quite a different nature.

Case 2. E.S., a woman, forty years old. When the patient was young, she fell down stairs. First symptoms of the disease were observed at the age of twenty years; while singing the patient observed that her voice became deeper and deeper, changing gradually, from a soprano to a contralto. Slight thickening of the fingers, of the upper chest and neck was noticed in the following years, but without the true disease being recognized. At twenty-seven years of age the patient underwent an operation by a well-known specialist in cosmetic surgery to reduce the size of her thick nose. At a postexamination this specialist drew the patient's attention for the first time to the possibility of acromegaly.

After the twenty-eighth year, the trouble progressed constantly: considerable increase of weight, enlargement in size of the feet and circumference of the fingers so that her rings had to be enlarged on several occasions, increased deformity of the facial features, stiffness of the limbs, staggering gait, difficulty of moving the head to the sides, psychical depressions, weakness of memory.

A comparison of Figs. 8 and 9 shows plainly the extraordinary alterations of the features. The photograph in Fig. 8 was taken before the beginning of the illness. The nose, in spite of the surgical correction is again greatly deformed. The superciliary ridge and the zygomatic arch are strongly projecting. The upper and lower blubbered lips do not form a protruded step of lip, as in Case 1. The supramental fold is distinctly pronounced. The chin is strong and projecting. All parts of the profile of the lower part of the face are greatly advanced to the vertical profile line. The face has a long oval shape, mostly found with acromegaly, in a very marked form.

The state of the denture (Fig. 10), compared with an anatomically normal one, is of special interest. Nearly all teeth in the maxilla and the mandible are separated one from another by spaces; these are especially striking on the left side. The space between the canine and the lateral incisor is especially pronounced. The maxillary and mandibular incisors show a coronal protrusion. The mandibular posterior teeth are totally straightened from their physiologic lingually tilted position, and the mandibular dental arch is considerably wider than the maxillary arch, which results in a left-sided cross-bite when the jaws are in occlusion.

The most striking discovery is the absence of a mandibular protrusion (Fig. 10*B*). Maxillary and mandibular incisors touch in a normal, if only slight, overbite. The molars and the canines form a complete neutroclusion (on the right side the conditions are somewhat more complicated by the extraction of the first molars and the backward moving of the mandibular premolars; but after "reconstruction," however, a neutroclusion exists here also). In spite of the

marked prominence of the chin, which permits the conclusion that there has been an extraordinary lengthening of the mandible, the occlusion has not been dislodged in the sense of being a mesioclusion. The development in length of the maxillary dental arch has kept pace with that of the mandibular arch, although one can also recognize by the posterior position of the subnasal point and the inclined direction of the upper lip that the maxillary basal arch (body of the maxilla)—as far as one is justified to isolate such a part—has not kept pace in

Fig. 8.—Patient E. S. Photograph taken in 1910 when patient was twenty years of age. The face still shows fully harmonious features.

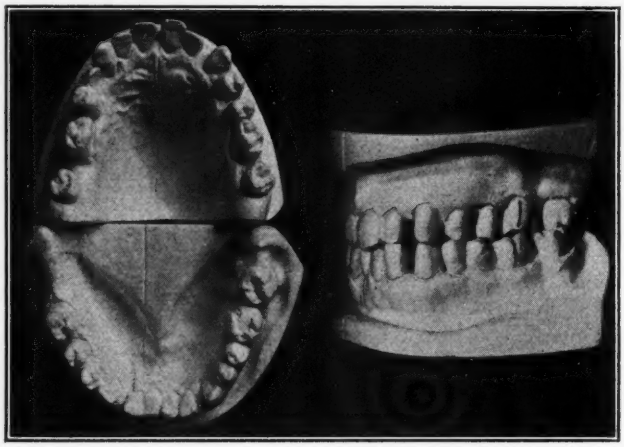
Fig. 9.—Patient E. S. Photographs taken in 1930, twenty years after first symptoms of acromegaly.

an equal way with the sagittal development of the maxillary and the mandibular dental arches and the body of the mandible.

The greatest developments in sagittal direction are found, without doubt, and can easily be seen from the photograph of the profile, in the mandible, and the least are found in the maxilla, while the dental arches have an intermediate amount of growth. As the numerous spaces between the different teeth, the extraordinary coronal widening of the mandibular dental arch and the coronal protrusion of the mandibular and the maxillary incisors are signs of the displacing pressure of the greatly enlarged tongue, the individual movements of the

teeth are the chief factors in this case. Why, in spite of the pressure of the tongue, the mandibular dental arch did not move in unison with the forward growing mandible, resulting in a mandibular protrusion of the teeth, but maintained its neutroclusion, is a question difficult to answer. The overbite of the incisors is very small and should, therefore, have caused little hindrance. This case is a striking example for the relative independence between the growth of the mandible and that of the mandibular dental arch, superimposed on it.

The individual movements of the teeth, caused by the pressure of the hypertonic tongue, are predominant; but an abnormal occlusion has been caused by the varying influences of both dental arches, as is proved in this case by the crossbite on the left side, caused by the larger widening of the mandibular dental arch. Probably, also in the mandibular protrusion associated with acromegaly a considerable share of the mesioclusion will be due to macroglossia. Surely, the



*A* *B*

Fig. 10.—*A*, Occlusal view of models of patient E. S.; *B*, Models in occlusion. Note the neutroclusion of the molars and the persisting overbite of the maxillary incisors.

enlarged tongue will have a stronger influence on the mandible than on the maxilla.

The state of the denture in this case shows an entirely different picture to that of Case 1. Individual movements of the teeth, caused by the dislodging pressure of the enlarged tongue (tiltings and forming of spaces), are the principal features. In spite of the massive and extreme development in length of the mandible, which has taken place on a much larger scale here than in the maxilla, no protrusion of the incisors has occurred.

All other cases of acromegaly which I have observed, show changes in the form of the jaws and in the position of the teeth, and lie between these two extreme cases. Other cases show an abundance of forms and shapes of very different reactions of the growth impulses of acromegaly.

Case 3. M. R., a man, forty-two years of age. First symptoms of acromegaly were observed at thirty-two years of age, after he was injured at the Front, during the war. Severe headaches accompanied the gradual hypertrophy of the outstanding parts of the head and the extremities. In the last years the

patient needed bigger boots every year. The height of the body increased from 168 cm., a measure taken while he was a soldier in 1904, to 178 cm. (1926).

The patient shows the characteristic habitus of acromegaly, but it is rather striking that the lower part of the face is not so prominent as in the first two cases (Fig. 11). The chin has characteristically advanced and is marked by a pronounced supramental fold but remains, like the mouth, behind the strongly enlarged and prominent superciliary arch, the zygomatic arch and the nose.

Fig. 11.—Patient M. R. (Case 3) photograph taken when patient was forty-two years of age, ten years after first symptoms of acromegaly appeared.

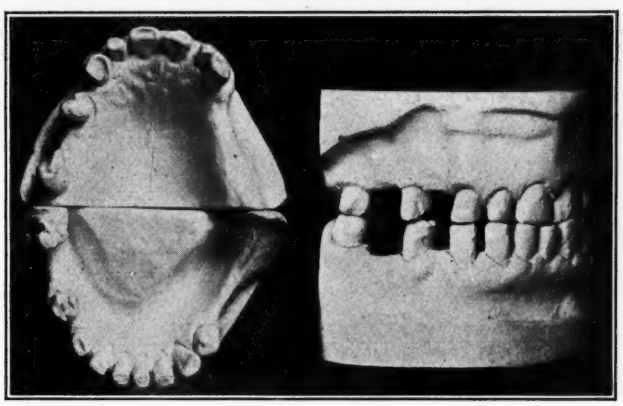


Fig. 12.—Models of patient M. R. Note the spaces between the mandibular teeth and the edge-to-edge bite of the incisors.

Analysis of the denture does not disclose mandibular protrusion in this case, but only an edge-to-edge bite with pronounced abrasion of all the teeth (Fig. 12). Because of the loss of nearly all the premolars and molars, a detailed analysis of the models was not possible. The characteristic spaces between the maxillary and mandibular incisors and the coronal protrusion of the mandibular incisors show, however, that here also there was a pressure from the inside to the outside, the pressure of the abnormally enlarged tongue. The mesial shifting of the mandible into edge-to-edge bite can be explained in a different way: (1) by the conjoint advance of the teeth together with the enlargement of the mandible in length;

(2) by the individual moving of the teeth on the basal arch (body of the mandible), caused by the pressure of the tongue; (3) by the gradual changing of the joints in form, caused by the chewing functions (as found with masseter chewers). The marked signs of abrasion speak for a very gradual shifting of the mandible into edge-to-edge bite. But this assertion cannot be stated as a proof of the physiologic character of this occlusion, as growth due to acromegaly takes place very gradually, and sometimes needs years under certain conditions.

Fig. 13.—Patient P. P. Photograph taken nineteen years after the beginning of acromegaly, when patient was forty-eight years of age.

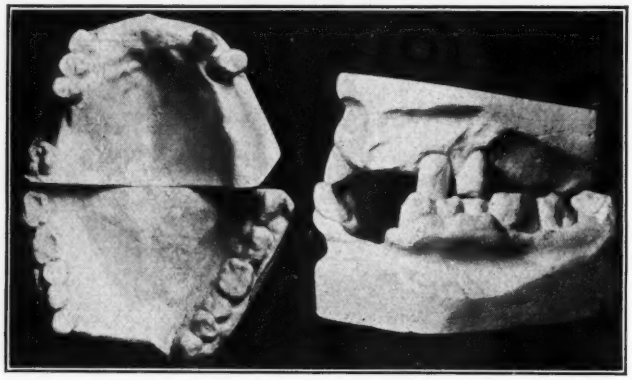


Fig. 14.—Maxillary and mandibular models of patient P. P.

Case 4. P. P., a man forty-seven years of age. First appearance of acromegaly was when patient was twenty-eight years of age, after a fall into a well. There were abnormal growth of the hands and feet, coarse changes of features (Fig. 13), exhaustion and dislike for work, and the libido sexualis vanished nearly entirely. Radiographs show, besides an extraordinarily enlarged frontal sinus a sella turcica of the size of a pigeon egg.

In the denture the abnormal distance of the mandible from the maxilla is striking and has led to a crossbite on the left side (Fig. 14). Unfortunately, all the teeth are missing in the front of the jaws, but it appears from the position of the alveolar crests that previously a slight mandibular protrusion or an edge-to-edge bite had existed. The facts ascertained until now, concerning mandibular

deviations, the straightening of the mandibular premolars and molars from their normal lingually tilted position and, furthermore, the buccal tilting of the maxillary canines and premolars remind one of the dislodging tendency of macroglossia, which apparently exercises a stronger influence on the genesis of acromegalic anomalies of the teeth, position, and jaws, than the direct consequences of the pathologic growth in length of the jaws.

Case 5: Mrs. A. K., fifty-one years of age. Fig. 15 shows a photograph of the patient at the time of her marriage when she was twenty-four years of age. Fully harmonious features were then still existing. First appearance of acromegaly was when she was thirty-three years old. From that time on, there was a gradual change of the countenance until now there is present a very strongly developed habitus of acromegaly (Fig. 16). There is strong projection of the extraordinarily thickened nose and of the mandible; hands and feet are considerably enlarged (Fig. 17); and there is macroglossia.

The most projecting part of the lower face is the mandible, with the chin, which is massively advanced. Unfortunately, all the teeth are missing, so that the previous state of the occlusion and the position of the teeth could not be ascertained. To judge from the position of the alveolar process, an edge-to-edge bite or even a slight mandibular protrusion had existed in previous days.

If we now try, after giving the above facts, to answer the questions which were raised at the beginning of this paper, regarding the changes in position of teeth and the form of jaws, there is a variable picture, especially regarding the occlusion of the jaws in relation to each other. In pronounced cases the dental arches show an extraordinary enlargement, and the mandible is especially affected with this abnormality. In spite of the fact that the profile of persons afflicted with acromegaly consistently shows that the sagittal prominence from the superciliary ridge on the lower face increases continuously, a mandibular protrusion of the teeth, i. e., a Class III malocclusion, is not necessarily accompanied with acromegaly in every case. The relative independence between the body of the jaw and the dental arch is confirmed by the different kinds of changes in the occlusion.

Among the cases observed, one case of normal overbite of the incisors was found in spite of some other most obvious changes; there was one case of edge-to-edge bite of the incisors, and there was a pronounced mandibular protrusion in another case. Crossbite was found in two cases. In each case, the general growth of the jaws at the joint and at the ascending ramus is connected with the individual tooth movement caused by the pressure of the enlarged tongue. The more pronounced characteristics of all deviations in the mandible in comparison with those of the maxilla are probably not caused by a special influence of the endocrine glands on the mandible, but by continual pressure of the enlarged tongue in every direction, which besides the individual movements of the teeth may also cause a deviation of the mandible at the joint in a mesial direction. To differentiate these several influences in each individual case may be considered an impossible task. The stronger participation of the mandible expresses itself then in the occlusion; in the sagittal direction in a mandibular protrusion or at least in edge-to-edge bite, and in a lateral direction in a crossbite.

A comparison of these anomalies of the jaws with the symptoms of the orthodontic pathologic state of mandibular protrusion shows plainly the super-

**Fig. 15.**—Patient A. K. Picture taken when patient was twenty-four years of age. Fully harmonious features.

**Fig. 16.**—Right hand of patient A. K., considerably enlarged, compared with a normal hand.

**Fig. 17.**—Patient A. K., fifty-one years of age, eighteen years after first symptoms of acromegaly were observed.

ficiality of the methods of investigations practiced hitherto. A genuine mandibular protrusion is an anomaly of a definite genesis, the procedure of which has become better known to us in recent years, an anomaly mostly inherited, which

in spite of its principal localization in the mandible (prominence of the mandible) very soon influences the position of the maxilla in the facial skeleton. As Rubbrecht was able to ascertain with the help of profile diagrams of members of the same family, afflicted with a mandibular protrusion, the protrusion of the mandible is nearly always connected with a retrusion of the maxilla, giving the persons in question the typical careworn expression caused by the retreating position of the upper lip and by the strong marking of the nasolabial folds. By the same influence of the reversed guidance of the incisors, very often a crowding of the maxillary incisors is associated with genuine mandibular protrusion.

The changes produced by acromegaly in the denture are, however, of a wholly different nature. If here also the mandible shows considerably greater deviations than the maxilla, so the latter shows also a marked enlargement and mostly a protrusion of the maxillary incisors with abnormal interdental spaces. One cannot find, therefore, any signs of retrusion, no contraction, no frontal crowding.

The pressure of the enlarged tongue plays a dominating rôle in the renewed growth of the jaws, so that the symptoms caused hereby (formation of spaces between the teeth and the outward tilting of the teeth) are among the most reliable symptoms of acromegaly, while the changes in the occlusion can vary considerably.

The mandibular protrusion of acromegaly shows such additional characteristic symptoms that it cannot be confused with the orthodontic pathologic state of mandibular protrusion. It represents only a symptom, though a striking one, of a very severe disease, which is so typical that the disease itself cannot be overlooked.

The similarity of these two forms of mandibular protrusion is, therefore, only a very exterior and superficial one. Also in the habitus of the child afflicted with a mandibular protrusion, nothing can be found which can be brought in any way into relation with the appearance of acromegaly. We have repeatedly made examinations to ascertain whether in patients afflicted with a mandibular protrusion the presence of an enlarged sella turcica and a disturbance of the endocrine balance could be proved, but all examinations proved to be negative. The idiotypical fixing of the anatomic or physiologic causes which lead to mandibular protrusion, and this in respect to the inverted direction of the axis of the maxillary incisors or to the increased growth in length of the mandible, finds its fullfilment in a different way, as in the case of a tumor of the hypophysis, which will produce growth in all parts of the body. Surely, it will facilitate our further investigations regarding the genesis of the anomalies of the jaws and will add to the explanations of their mutual etiologic relations, when the orthodontic anomaly of mandibular protrusion is distinctly separated in the future from the pathologic symptom of the acromegalic mandibular protrusion, with which the former has nothing in common, and this is in regard to both origin and appearance.

DISCUSSION

*Miss Tildesley, London,* said that the Royal College of Surgeons, whose museum many had visited, has received during the last year two cases of acromegalic skulls and also

skeletons which give still more extreme instances of disharmony between the maxilla and mandible than were seen today, they might be interesting for study by orthodontists. In one case there was no point of contact between the maxillary and mandibular dental arches.

*Dr. Singer, New York,* asked whether acromegaly occurred in youth.

*Dr. Korkhaus,* in reply said that Miss Tildesley's observation was of special interest to him, as unfortunately cases of acromegaly which can be observed from a dental point of view were very scarce, and in all the literature he had read on this subject he had found reports of only about twenty cases that dealt with the teeth and occlusion and these only superficially. He wished to say that we must go from superficial general remarks about etiologic influence to distinct ideas and that this is only possible by earnest research work.

In reply to Dr. Singer's question he could say that all the persons whom he had observed showed the first symptoms between the ages of twenty and forty years. Acromegaly does not exist in youth. It is an overdevelopment after the natural development in youth, and can be, according to modern views, influenced by a tumor of the hypophysis.

If any members of the Congress should have the opportunity of observing a case of acromegaly, he would be very grateful if they would communicate with him and let him know what has been found.

# THE TAKING OF IMPRESSIONS AND THE AUTOMATIC CASTING OF MODELS FOR ORTHODONTIC DIAGNOSIS*

DR. SYLVAIN DREYFUS,† LAUSANNE, SWITZERLAND

DIAGNOSIS in dentofacial orthopedics, as in every other branch of the art of healing, has many phases. Let it be made clear at once that this study will be limited to morphologic diagnosis. In order to establish a good diagnosis, it is necessary to have the most complete information. If a method of diagnosis is to be used in every day practice, it must be as simple as possible.

We must therefore endeavor to reconcile two diametrically opposed points, simplicity with the maximum of information. We must select facts and take into consideration, not all the facts that may be connected with diagnosis, but only such points as are essential, and we must reduce these to the minimum for simplicity. If in some cases more complete information is necessary, nothing will hinder us from examining all the elements of diagnosis that we may consider indispensable for the case in point. We might even—getting away from the region of direct intervention—study the form of the fingers and observe the proportion of the limbs.

The following points are absolutely necessary for establishing a diagnosis:

1. The two auricular points and the two infraorbital points which determine the plane of orientation, the Frankfort plane, and consequently the orbitofrontal plane (Simon's plane). Let it be understood at once that the orbitofrontal plane which we take does not correspond exactly with Simon's. It is slightly posterior to it, for we take the two orbital points, not as does Simon, but according to anthropologic data.

2. The nasion point on the profile is, in my opinion, one of the points essential to diagnosis. In the first place, it determines the nasofrontal plane (Dreyfus' plane) which may equally well be termed the profile plane. In the second place this point is in the center of the face, since it is situated at the root of the nose, in the center, between the two eyes. (Figs. 1 and 2.)

There may be asymmetries in the face, but the center will always remain at the root of the nose, between the two eyes.

It is through the nasion, therefore, that we shall pass the sagittal median plane (Dreyfus' sagittal plane); and it is the nasion, consequently, which will determine the sagittal line of symmetry of the dental arch.

As I wrote some years ago, I am unable to consider the median raphe as the line of symmetry, for it presents too much variability.

I shall go a little further into detail in regard to the nasion and discuss it in its relation to the central frontal glabella. In my opinion it is an error to make the anterior frontal plane pass through the central glabella, for anthropologically

*A demonstration given at the Second International Orthodontic Congress, London, July, 1931.

†State Federal Dent. Dipl. Switzerland; Doctor in Medic. Dent. University Geneva.

we have not here a precisely defined point. In any case on a photograph—without taking into consideration the eyebrows, which blur everything—the lateral glabellae, which project, often hide the central glabella; it is therefore the lateral glabellae that in reality fix the anterior frontal plane. Up to this point the matter is of no great consequence, since we are not aiming at mathematical precision in our studies but rather at indications and signposts.

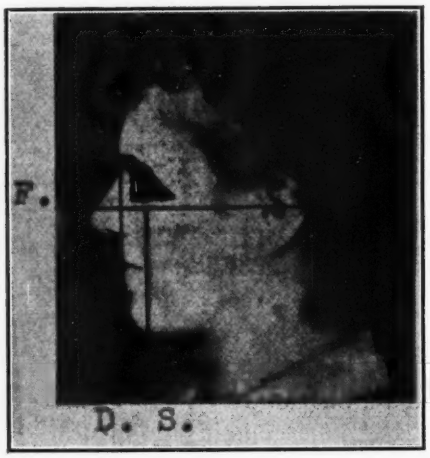



Fig. 1.—*F*, Frankfort plane; *S*, Simon's plane; *D*, nasofrontal plane of Dreyfus.

One disturbing fact, nevertheless, obliges us finally to reject the central frontal glabella. We know how often treatment is required as a result of rickets, and we know, on the other hand, to what extent the frontal process bears the marks of this disease. The frontal glabella is a very thin bone which would be very

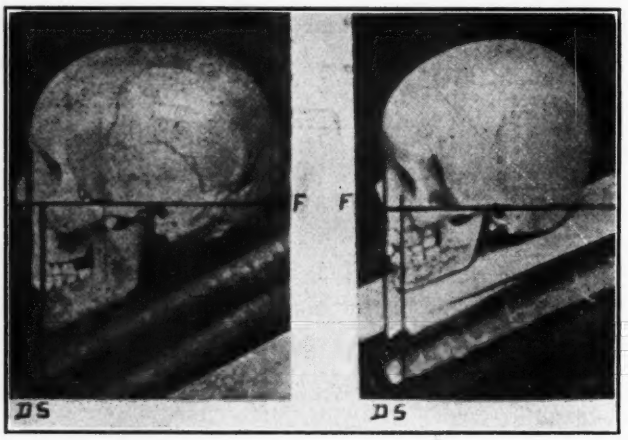



Fig. 2.—*F*, horizontal Frankfort plane; *S*, Simon's plane; *D*, nasofrontal plane.

sensitive to pressure from the brain, and we see the forehead bulging forward, carrying with it the central and lateral glabellae. If we take as the anterior frontal plane a plane passing through the glabella, this plane will be carried forward and our means of diagnosis will be falsified. How can one judge of prognathism of the maxilla, if in order to measure it, we take a point which has been deformed and pushed out of place in the same direction? Taking an extreme case and supposing

that the frontal process and the maxilla are displaced to an equal extent (which is perhaps beyond the bounds of possibility), we should erroneously conclude that the condition was one of orthognathism.

We know very well that it is particularly the lateral glabellae that are affected by this disease, but we have seen in the photograph that the lateral glabellae hide the central glabella in such a manner that our reasoning would perhaps not be invalidated in regard to the consequences.

Let us now consider the nasion and see whether it is susceptible to a similar variation. I am far from asserting that the nasion is an immutably fixed point. No, the nasion is variable, like all the other points of the skull, even the basion itself.

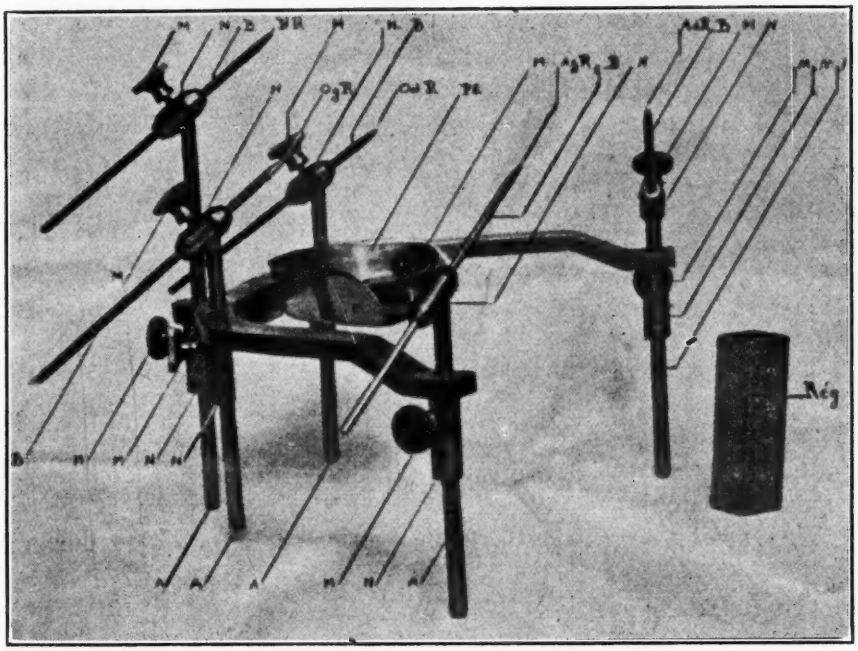


Fig. 3.—Gnathostat or facial arch. *A*, movable vertical rods; *B*, movable rods; *M*, set screw; *N*, grooves; *R*, record points; *Ad Ag*, records of auricular points; *NR*, record of nasion; *Od Og*, records of orbital points; *PE*, impression tray adapted to the apparatus; *Reg*, graduated measure.

What we want to discover is, not whether the point is a fixed one, but whether it is less variable than another.

Where is the nasion situated? The nasion is placed at the base of the frontal process, on the nasofrontal suture. This region is entirely different from the remainder of the frontal process, supported as it is by a complex and voluminous mass of bone, among others by the ethmoid process. Naturally, this region would also be affected by rickets, but the framework that supports the nasion is so thick and so extensive that outside pressure would have only the most limited influence on it, even if we cannot assert that it would have no influence whatever.

Another fact shows the slightness of variability of the nasion, and that is the presence of the frontal sinuses. It is evident that before reaching the nasion it is upon the posterior wall of these cavities that this deforming action would be brought to bear. Since the frontal sinuses are not hermetically sealed, but communicate with the nasal fossae and consequently with the exterior, any pressure

brought to bear on the posterior wall would not be communicated to the other walls. The nasion is therefore well protected, and it has a just claim to be selected for the establishment of our diagnosis.

There is another point in the profile which is also of interest, and which in certain cases is of the greatest importance, particularly for diagnosis. I spoke earlier of the nasospinal point. Unfortunately this point is difficult to determine when the impression tray is in the mouth, deforming and displacing the soft parts (lips and cartilages). If we take the impressions sufficiently high up, we should more often than not gain sufficient information on the position of the nasospinal point. Its exact position might be transcribed on a graph, but in no case could it be carried on to the model (unless by means of an indirect method), since, I repeat, this point cannot be correctly reproduced at the time of taking the impression.

This introduction will indicate what is required from the models.

Before the impressions are taken a facial arch with rigid and variable rods is adapted to the impression slab to record the auricular and infraorbital points

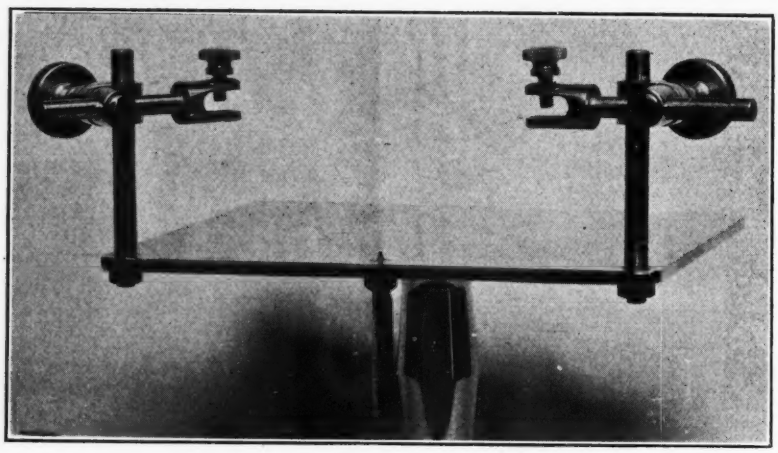


Fig. 4.—Casting apparatus.

(right and left); in the center, in front, a fifth rod will record the nasion (Fig. 3). When these points have been recorded on the model, set screws hold the different rods in their respective positions. When this is completed, the facial arch is withdrawn and the impression is taken out of the patient's mouth.

In the laboratory the facial arch is transferred to a casting apparatus of which I shall give a brief description. There is a slab with a plane surface upheld by a pedestal (Fig. 4). On either side a simple means of fixing allows the facial arch to be made rigid in such a manner that it constitutes one body with the casting apparatus. In its anterior portion a small sharp spike rises above the plane. Above this spike, exactly in an orthogonal position there is a graduated bar, a measure, showing a slight longitudinal groove in front.

*Method of Use.*—The facial arch is transferred to the casting apparatus (Fig. 5) in such a way that the four auricular and infraorbital points lie on the plane, the surface of which is henceforth identical with the Frankfort plane. The regulating point of the nasion is transferred to the anterior angle of the measure which is situated under the plane. The little spike which rises above the plane

is then found to be the orthogonal projection of the nasion on the Frankfort plane. The height of this point may be read directly on the measure and is inscribed on the model. The facial arch is then fixed and rendered immovable in this position by means of the two prepared fixations. The facial arch and the casting apparatus are therefore united into a whole.

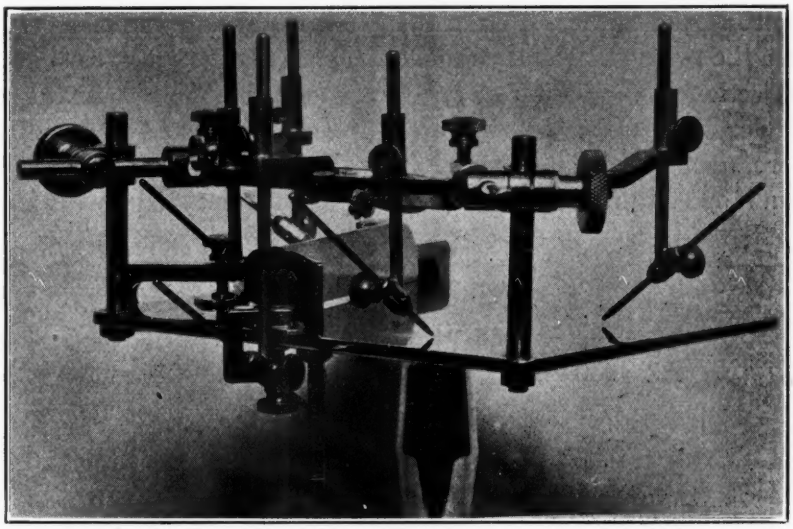


Fig. 5.—Fixation of the facial arch on the casting apparatus and first phase of the construction of the model.

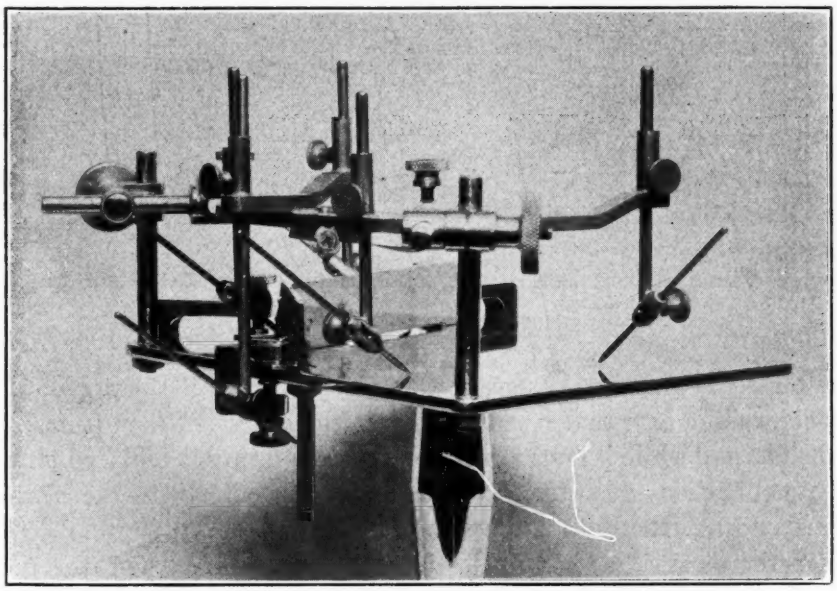


Fig. 6.—Same as Fig. 5.

After this first operation is finished, the cast must be constructed. For this purpose I use one of the small movable walls perpendicular to the principal plane (Figs. 5, 6 and 7). The first wall is placed in front, its position being determined on one side by the projection of the nasion, the little point we have indicated above, and on the other side by one of the infraorbital points. By means of clamps this

plate is fixed firmly to the casting apparatus. A second anterior plate is fixed in the same manner, its position being indicated by the projection of the nasion and the other infraorbital point. Finally the two lateral plates touching in front the orbital point and behind the auricular point (left or right according to the side) will be similarly fixed by means of clamps.

The mold is complete (Fig. 7) and its base is limited by the boundaries rising from the projection of the nasion to the two infraorbital points in front and laterally from the two infraorbital points to the auricular points. The anterior angle is the projection of the nasion on the Frankfort plane; the summits of the two lateral angles are exactly the two orbital points. The auricular points will be found there, no matter what size one makes the model, or at least it is easy to find them again if one takes the trouble to transfer the orbitoauricular distance.

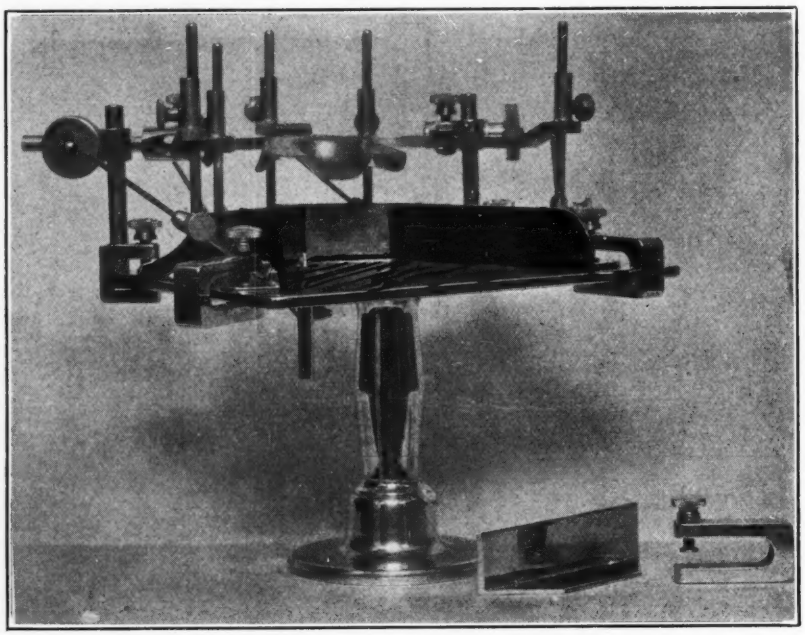


Fig. 7.—Casting apparatus set up and ready for use.

The plaster is prepared as usual. One places some in the impression tray and in the mold, taking care that it runs well into the angles. When it has reached a certain height and while it is still soft, the impression tray is replaced on the facial arch, the mold is closed posteriorly with a plate parallel with the bitragial line (or corresponding exactly to it).

When the plaster has hardened, the clamps are unfastened, the facial arch and the different plates are removed and the model is developed.

The base of the model (Fig. 8) will be found to be identical with the Frankfort plane. The anterior angle of the model is a straight line formed by the nasofrontal plane and the median sagittal plane. It is the line of the profile, an orthogonal projection of the nasion onto the Frankfort plane, determining the anteroposterior anomalies of the incisal region, just as it fixes the anatomic surroundings of the dental arch.

The two lateral angles are in the orbitofrontal plane, the highest points of these straight lines being the orbital points. This plane, which we shall continue to call Simon's plane, although it is not exactly that designed by him,* determines the general anteroposterior relationships of the maxilla and the teeth.

Let us point out this fact: in the plates that have formed the walls of the model, being perpendicular to the Frankfort plane, their intersections will give straight lines which are similarly perpendicular to this plane and are consequently in the other planes just mentioned.

A plane passing through the orthogonal line of projection of the nasion, perpendicularly to the bitragial line, gives us the median sagittal plane that we can transfer to the model.

The maxillary model, which we have cast according to this process, includes the essential elements of diagnosis. According to the relative positions of the teeth of the maxilla we can establish our diagnosis of the mandible, placed in the actual articulation of the patient.

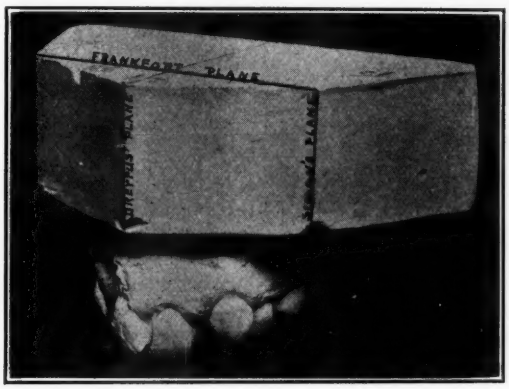



Fig. 8.—Model as it leaves the cast, with information for diagnosis.

In Figs. 9 and 10 are shown two cases of Angle Class II, one being actually a case of prognathism of the maxilla and the other one of retrognathism of the mandible.

However, other cases occur very frequently the appearance of which gives the impression of Angle Class III. Very often in these cases the maxillary incisors are found in retroposition, and when the patient wishes to close the mouth the mandibular incisors meet edge-to-edge with the maxillary incisors. He is therefore unable to close his mouth completely in the molar and premolar regions. In order to masticate, the patient carries the mandible forward, the mandibular incisors slide in front of the maxillary incisors, and the back teeth come into occlusion. In this case it is enough to develop the maxilla in the region of the incisors, and the normal position will be automatically recovered. The study of the maxilla having shown us the deformities occurring there, by deduction we can treat the anomalies of the mandible.

I do not think it necessary to explain here how one proceeds with the mandib-

*We consider it necessary to insist upon this point, so that no one can say that Simon's plane passes in a different manner according to the author. No, it is differently constructed, and this modifies its relationships with the teeth.

ular model, which has its base parallel to the base of the maxillary model, these methods being well known.

The advantage of this method is in having the elements essential for diagnosis united in one comparatively small and easily handled model, the different governing points being reproduced in it in an exact manner. We should particularly insist on the line of the profile, the anterior median of the nasofrontal plane, which is an element of great importance.

The procedure that I have just described is in reality very simple and can be carried out in a very short time (recent demonstrations in London and Paris have proved this beyond a doubt). Moreover, the model is turned out ready for use, and it is not necessary to trim it, as one has to do with ordinary models. I have investigated the matter, and I can affirm that it takes longer to trim a model than it does to go through these various steps. I should merely recall how the model came out that I made in London when demonstrating before my colleagues in their presence, when I was without any of the conveniences usually at hand in the laboratory.

Fig. 9. Fig. 10.

Figs. 9 and 10.—Two cases belonging to Angle's Class II. Fig. 9 shows prognathism; Fig. 10 shows retrognathism.

A cinematograph film, also presented on the occasion of the International Congresses of London and Paris showed the simplicity and ease of this method.

The most timid patient feels no fear when we take impressions with the facial arch, fears which one often encounters and which constitute an incontestable complication with a great number of other apparatus. It goes without saying that this method does not suppose the abandonment of photography; on the contrary, photographs of the profile and face before treatment ought to be made, if only for purposes of record.

The point of this method is particularly remarkable when we are confronted with a case of asymmetry. Let us suppose the incisors are arranged as in Fig. 11. A central is placed in front of the other central, the space between it and the lateral being insufficient for the tooth to assume its correct position. Where does the center lie? When we look at the patient's face, we easily obtain the answer. On the other hand, an ordinary model supplies us with no indications, even the labial frenulum being out of place. Our process of transferring the line of the nasomedian profile onto the model will always give the exact position of the center. Ac-

cording to this line if the medial edge of the tooth falls in a wrong position on the medial edge of the neighboring central, we shall know at once which side of the dental arch we have to correct. We shall know whether we have to operate entirely toward the right, or entirely toward the left.

I am giving here extreme cases, for in most cases the center is found between these two positions, and expansions have to be made in both directions, but here again the nasomedian line will be of the greatest help. It shows us quantitatively in what proportion we must operate on either side. What is true of the incisor

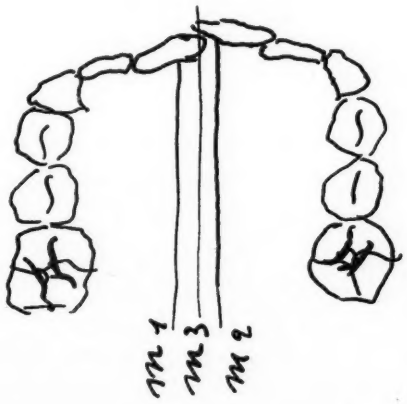



Fig. 11.—Asymmetry. According to the position of the center at M1, M2, or M3, operation will have to be more or less in one direction or in the other.

group also holds for the entire arch, and I have seen cases where the atresia was entirely unilateral. This method of diagnosis allows us to see that one of the sides was absolutely normal and that it was only on the other that we needed to operate; any other procedure, more especially ordinary models, would not have given us this information.

The rational method by which I cast the models seems to me to be equally suitable for the predetermination of the arch, according to the very ingenious and interesting method of Dr. Stanton.

# *DEPARTMENT OF*
# *DENTISTRY FOR CHILDREN*

## THE VALUE OF ORTHODONTIA AS A HEALTH SERVICE*

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A COMPARATIVELY short time ago no one thought of consulting a physician except for specific illness; one was usually confined to bed before it was thought necessary to summon the doctor, and no one went to the dentist except for toothache. Yet in a short space of time we find men, women and children making periodic visits to physician and dentist simply to be assured that all is well. Public health service is a national project, and conspicuous among the activities of its many branches throughout the land we hear the terms preventive medicine and preventive dentistry. Thus, in a few years we are converted from the belief that the physician and dentist can cure only specific ills, to the realization that they can prevent many ills to which the human race is heir.

With the advent of public health service and preventive medicine and dentistry, we arrived at a new comprehension of just what health is: not merely the state in which the individual is not a prey to specific disease, but also the state in which he is free from the handicap of lowered vitality or impaired efficiency due to slight systemic disorders. Health is that state of well-being in which it is possible for the individual to function to the highest degree of efficiency possible; he looks well, feels well, acts well and is well. In other words, there is simply no room left for disease.

It is not beside the point to consider in this much detail just what we mean by health, for it is only when we realize the important rôle the teeth play in the health of the individual that we can appreciate our responsibility in the field of preventive medicine.

We have a long way to go, for as yet only a small part of the large amount of money being expended annually for medical care, nurses, hospitals, clinics, dentists and oral hygienists, is being used to prevent illness. There are certain things responsible for this: one, of course, the very newness of the knowledge that sickness can be prevented by proper health measures; another, the lack of education of both the laity and the various branches of the medical and dental professions. In thickly populated areas preventive measures are recognized as necessary to preserve the health of the nation, but in more remote communities we have yet to wake up to the progress in this direction. Still another thing is that we have yet a great deal to learn as to how much we can

*Read before the Eleventh District Dental Society of Georgia, November 10, 1932.

prevent the occurrence of disease. We are largely in an experimental stage today; a new light of understanding is beginning to dawn.

I wish to discuss the question of preventive dentistry as it relates to the science that is nearest my heart—orthodontia. There are, of course, two distinct methods of prevention: first, we strive to recognize and correct incipient stages of disease; second, and this is prevention in its truest sense, we aim to make the laity understand how disease may be prevented even from becoming incipient.

In its earlier conception orthodontia was looked upon more as a mechanical art, as it related esthetically to the appearance of the individual; and orthodontists bent their efforts to every possible means of removing disfigurement and deformity by correction of the irregularity of the teeth, with little realization of the underlying fundamental truth that abnormally arranged teeth had a bearing upon the general health of the individual in direct ratio to the seriousness of the irregularity. Now, we understand how important is the proper interaction of the parts and processes composing the dental apparatus in the well-being of the individual. We are losing sight of the facial disfigurement in an effort to develop a proper understanding of just how much it means to the individual to have a normally functioning dental apparatus, safe in the newer knowledge that Nature is by no means losing sight of the deformity and that restoration to normal function as a health measure reaps a double harvest in relief from deformity.

Only a short time ago we thought of dentistry for children mainly as being concerned with relieving toothache and extracting teeth. Unfortunately, many extractions were committed in the name of dentistry that have cast a shadow upon the conscientious scruples of the profession, for many teeth have been lost that would have been saved had we been working with the same knowledge we now possess. It was almost an unheard of thing a few years ago to fill "baby" teeth. "He's going to lose that one anyway, why spend money on a filling?" But we have learned differently, and the dentist now knows that it is his duty not only to relieve his little patient's aching teeth but to preserve the health of the child's mouth by every means known to science and to counsel the parents or responsible parties wisely with reference to the deciduous teeth.

It is this preservation of dental health and this wise counsel that have to do with orthodontia as a health service. When we view the rapid strides orthodontia as a distinct specialty has made in a comparatively few years, from a mechanical art to a science with its fundamentals rooted in the very core of the human being's biologic complexity, we must consider with regret the fact that so little emphasis is placed upon this specialty by the average dental college. I am sincere in the belief that in practically no course of general dentistry offered the dental student is the proper significance attached to orthodontia as a distinct and separate science. We might almost say that the curricula of some dental colleges "freeze out" orthodontia, giving it such an insignificant part in the course that an almost complete misconception prevails as to its true nature; so that the graduate dentist is more impressed with the mechanical side than with the enormously important fundamental of the true bearing that dental inharmonies have upon the individual well-being.

It is no wonder that so many well-meaning crimes have been committed in the name of orthodontia by the general practitioner acting under the impression that his mechanical knowledge would carry him through and crown his efforts with success, but later having to view with dismay the havoc he had wrought in the mouth of his trusting patient. This is no indictment of the man who undertakes a case requiring orthodontic treatment on the assumption that the graduate of a dental college is qualified to handle such a case, but rather an indictment of the dental colleges in so lightly skimming over the basic principles of so important a specialty.

Orthodontia has long since ceased to be a problem of mechanics. It has become a problem of growth and development, as closely related to the medical profession as to the dental. When we consider the many outstanding men of our profession who are devoting their every effort to a study of the orthodontic problem, and realize how complex they have proved the fundamentals of orthodontia in its biologic aspect, we would seem foolish indeed to think that the mind of the recent graduate of the dental college is prepared to grasp these basic principles without years of experience or specific training in them. I feel it important to emphasize the fact that the proper importance should be attached to orthodontia as a specialty and the student should be impressed with the fact that it requires far more than mechanical skill; that he must first be versed in the fundamentals of general dentistry, and that before he should attempt the practice of a major specialty, he will need specific and thorough training in that specialty.

The general practitioner and the orthodontist are very closely related in their responsibility in the field of preventive dentistry, and probably the general practitioner has the greater opportunity in this direction, because, in the large majority of instances, the dentist is consulted before the orthodontist.

The general practitioner, therefore, should be vitally interested in malocclusion in all its abnormalities and manifestations, however slight, and should advise the patient so far in advance of the occurrence of deformity that orthodontic treatment will not be necessary. Trained as he is to recognize normal occlusion, it is all the more important that he should not neglect even a slight manifestation of abnormal occlusion. When we consider the astounding fact that statistics tell us that 90 per cent of all our children are suffering from malocclusion in some degree, and only an insignificant percentage being treated, we feel more deeply this responsibility. Was it necessary for all these children's teeth to "grow crooked"? I do not believe it would have happened had the dentists shouldered their full responsibility both to recognize defects and to advise the responsible parties what steps to take to prevent deformity.

The dental profession is in possession of priceless information in regard to health. Are we content to keep it secret? Too long have our professions for the treatment and correction of human bodily ailments been inclined toward holding back from the public important truths which it has a right to possess. We are, in my opinion, betraying a confidence when we fail to consider this as our responsibility and fail to give to those who consult us the benefit of our advice and information. What is to be obtained except human suffering by cloud-

ing the truth about health? I know that we are motivated by the belief that we are conscientiously discharging our professional duties when we relieve trouble, but I am more strongly inclined to the belief that we should prevent trouble before it occurs by the dissemination of well-considered advice and information as to proper health habits.

In considering the etiology of malocclusion we find ourselves confronted with so many different factors that it hardly seems within the province of this paper to consider any of them. Suffice it to say that from one cause or another, which have been discussed many times, there develops an inharmony or maladjustment of the dental arches, and they begin to function improperly. It seems hardly necessary to pause for a moment to consider what may happen when the dental apparatus begins to function improperly, but so important are the results that I wish to stress briefly just what does happen:

In a properly functioning dental occlusion, three points are important to study and understand absolutely: the approximal space, the contact point and the occlusal contacts. Any abnormality in the function of the jaws will result in serious trouble to one or the other of these points.

We all know that a normal denture is self-cleansing and only the simplest prophylactic measures are necessary to keep the teeth clean if they function normally. But deviation from the normal makes self-cleansing impossible and prophylactic measures more difficult, for a perversion of the proximal space and contact point will result in a tendency to pack food between the teeth, wear down the proximal space, frequently resulting in caries and general bad health of the teeth and gums. In the loss of a single tooth, five teeth, directly, and the entire dental arch, indirectly, are involved: the function of the two occluding and the two approximal teeth is impaired by this loss, and a collapse of the dental arches occurs. When we take this fact into consideration, we recognize that the masticating machine is out of order, and there is resulting impaired efficiency in the function of digestion and body chemistry which begins in the mouth.

I have spoken very briefly of the importance of proper occlusion. It would require more time and patience than we have at our command to discuss fully the influence the proper functional relationship of the teeth has upon the health of the individual. But we can say, after a consideration of the process of mastication, that only normal occlusion makes for perfect health, and any deviation makes for distress varying from slight impairment of efficiency to serious and incurable illness. Moreover, we should consider that malocclusion, even in its mildest form, is a symptom of disease.

I do not wish to claim for normal occlusion of the teeth that it can rid the world of its ills—there are other sources of infection than through the dental areas, of course; but we readily recognize the great importance of normal occlusion in the health of the individual. It is there that the general practitioner and orthodontist should join forces. Gradually the public is coming into the dental office for the assurance that the teeth are sound, the gums healthy. The gospel that is being preached abroad that the teeth are one of the most important sources of good health is reaching the homes of our people, and mothers and fathers are bringing their children into dentists' offices to have deciduous teeth

saved, to learn more about what they can do to safeguard their children's future health and happiness. They are coming open-mindedly, cooperatively, anxious to share their part in the great health program of the nation.

Wise counsel alone will many times forestall trouble. An understanding of the orthodontic problem will make it possible for the dentist conscientiously to advise the patient before it is too late, either to prevent an irregularity by proper health measures, or to consult an orthodontist for correction of an incipient irregularity before it has reached a serious stage.

"Samuel Butler tells of a land where it is a serious crime to be ill; instead of physicians the profession consists of 'straighteners.' In view of the difficulties that arise from efforts to cure faulty habits after a lapse of years, it is imperative to straighten children out during the years of greatest plasticity. . . ." From the *Challenge of Childhood* by Ira S. Wile.

That is the most important consideration in the whole orthodontic problem, "the years of greatest plasticity," the ideal time to prevent deformity. The theory of watchful waiting until the teeth become "crooked" is dangerous; delay is dangerous. Do not advise your patients to wait and let Nature correct the trouble. Better not advise them at all than to tell them that. I have already said that malocclusion is a symptom of disease—Nature is calling our attention to the need for something to be done to relieve beginning trouble; she has no infallible means at hand to overcome dental irregularities, but with science aiding Nature, trouble may be prevented from becoming serious.

In reviewing the history of dentistry, we find that in the year 50 B. C., one Celsus, a physician, advised that a tooth out of line should be pushed back in line by means of the finger. Time and again, in this enlightened age, we are told by parents of patients who present distressing forms of malocclusion that their dentist had told them to press on the offending teeth with their fingers a certain number of times for a certain number of minutes each day, and that the teeth would assume their proper positions.

Nothing could be more foolish than such a statement, nor more barren of results than such treatment. A tooth is out of alignment because of something fundamentally wrong in the dental apparatus, or because something is wrong with the general health. It is possible many times that proper diet and function of the dental processes will result in teeth assuming their proper positions, but this is true only in the case of a very slight deviation from normal, and so dubious is the matter at best that the time wasted in waiting for the teeth to straighten up of themselves is too precious and would have been put to much better account in aiding Nature. Certainly it is unfair to the patient to be given such advice unless the dentist is absolutely sure of his premises.

Orthodontic appliances may be compared to crutches or fracture splints employed to assist broken bones of the body to grow into normal position. It would be as foolish to insist that the patient with a leg in a plaster cast should walk without the aid of crutches, as to say it is not as proportionately important to give the tissue of the jaws due to irregularities similar assistance to grow right.

So new is preventive dentistry as it relates to orthodontia that it is almost

invariably true that the patient does not consult an orthodontist except when treatment is urgently indicated. However, with a greater interest on the part of the dental profession and a greater anxiety on the part of the parents to safeguard their children's health, it so happens that the orthodontists are sometimes consulted before trouble has developed, and we might paraphrase the old saying, "A stitch in time saves nine," to "Sometimes a visit to the orthodontist saves wearing appliances or having a disfigurement for life."

Dr. C. V. Mosby in a recent address on "Why the Public Knows So Little About Orthodontics," among other significant statements remarked as follows: "Dentists look upon most orthodontists as upon an octopus with long grasping arms and eyes located in various parts of his head, ever looking for well-to-do patients from whom they can extract the largest possible fee." Regrettably, I believe he is fairly accurate in this picture; though my experience has been almost entirely free from the feeling that I was so regarded. Yet from conversation with dentists and other orthodontists, I do know that a great deal of stress is placed by some dentists upon the fee the orthodontist charges.

Quoting from the editorial pages of the INTERNATIONAL JOURNAL OF ORTHODONTIA we have the following comment on orthodontic fees: "The criticism is often made without any relative comparison between the time spent in treating a case of malocclusion and the expense incurred during that time, and the time, expense and skill incurred in rendering service in the field of general dentistry." I bring this particular point to you, because I do not think it fair to the patient for the dentist to advise against orthodontic services on account of the fee for the work, or to comment upon the size of the fee to the patient as excessive for the work to be done. It is not within the rights of the general practitioner to discourage orthodontic services on account of the size of the fee or the length of time necessary to secure results. Frequently, the delay is the thing that is expensive, and after the delay the money is entirely inadequate to achieve the results that might have been possible had treatment been begun when first indicated.

In its incipient and early stages, the treatment of malocclusion is quite simple, the expense nominal, and the results are quickly achieved and permanent. As to the value of the orthodontic treatment to the patient, Dr. Patry has the following to say in a recent issue of the *Dental Cosmos:* "A skilled orthodontist can often prevent untold misery, unhappiness and even social and economic failure, as well as physical and mental disorders by timely intervention. Habit training, education in the importance of clean teeth and danger of infection and sepsis must go hand in hand with the importance of the position and growth of the teeth and their aberrations." If this be true, who then has the right to attempt to block the opportunity of the orthodontist in thus serving future generations?

We must not think of orthodontia as a service for correcting the malady overnight, any more than we would plant a rosebush and look for flowers the next day. We know that the successful flowering of the rosebush depends upon many things: proper planting, sun and air, water and fertilization, training; and the bud slowly blossoms into full bloom. Just so the little child needs care and training, and the slow unfolding of the years of childhood may thus be

likened to the unfolding of rose petals. Let us lose sight of the fact that the wearing of orthodontic appliances does not bring immediate results, remembering the more important point that we would far rather wait for the perfect rose than to cut rashly into the bud and try to rush our flowers in this way. Remember, too, for every rose, there are many thorns.

In conclusion, let me suggest that it has been my desire to stress the fact that we dentists and orthodontists, as an important branch of the nation's health service, have a heavy responsibility upon us to disseminate information that will be of constructive value in educating the people as to how vital a part the teeth play in the health of the race. Naturally, my slant is to see the part that orthodontia may play in preventive dentistry. Realizing that, and the further fact that the general practitioner's slant would probably be to see still another phase, I cannot but have seemed to make a plea for a more generous attitude in the general practitioner toward the part the orthodontist is playing.

I should like to have you think of the orthodontist, not as a long-armed octopus, not as one who is concerned with the aggregate of the fee he will collect from a case, but as a conscientious member of the dental profession who wishes to bring credit upon a high calling that has lifted itself within a few years from a questionable mechanical art to a most respected and esteemed health service to man.

# THE APPLICATION OF GLANDULAR, CALCIUM AND ULTRAVIOLET THERAPY TO ORTHODONTIA*

H. L. SPINNEY, D.D.S., SANTA BARBARA, CALIF.

I HAVE gleaned a few facts and some theory through the study of the glands of internal secretion, calcium metabolism and ultraviolet ray therapy which, I believe, would help the orthodontist in the solution of some of his difficulties. From observation, to me periodontia and orthodontia are basically the same, if you will take age into consideration.

Orthodontia is one of the most highly specialized fields in dentistry and holds a position there similar to that which orthopedics holds in the medical world. In its practice, the orthodontist is, by skillful mechanical aid, trying to assist nature in correcting an abnormal condition existing in the osseous structure of the oral cavity.

One of the most perplexing problems with which the orthodontist has to contend is the fixation of the teeth after he has moved them into position. The patient having just passed through the ordeal with regulating appliances, faces a new one, though less severe, that of wearing the retainers until nature comes to the rescue and fixates the teeth.

This condition and the irregularity previously existing in the mouth are not due to any local pathologic condition, but to abnormal development and faulty mineral metabolism, influenced to a more or less degree by local conditions.

During the period of growth and development there are three outstanding epochs wherein we might say that growth is accelerated or that the growth hormone predominates; namely, from birth to the second year, between the fifth and seventh years, and between the thirteenth and the sixteenth years. It is at these periods during which growth acceleration is taking place that nature's demand for material to supply the necessary tissue requirements is greatest; and if the supply is inadequate or through lack of proper assimilation, retention, fixation, mobilization and elimination, the body does not realize the full value of the food, the result will create a hyperplastic condition of the osseous structure which is very susceptible to influence by mechanical means, but is also just as easily influenced to returning to its original state by local stress.

It is also true that throughout the growth and development stage which is characterized by the most violent production of new tissue, both anabolic and catabolic processes are actively going on. But during this period there is a great preponderance of anabolic over catabolic activity.

"But it is hard to conceive that simply the provision of nutriment accounts for growth and development, without nourishment these phenomena would not take place. But there is something inherent in animal cells which drives them to divide, multiply and differentiate into special organs." (Draper.[1])

*Read before the Orthodontic Section at the meeting of the California State Dental Association, Oakland, Calif., April 4, 5, 6, 1932.

In the study of bone, we must bear in mind that while it is the hardest tissue in the body, it is a living tissue and should be given consideration as such. It is capable of undergoing changes both in form and in structure in response to either local or general influences; also it is in a constant process of resorption and replacement. The maintenance of normal bone structure is dependent upon a delicate balance between these two processes. On this balance which is less stable than it appears to be, there are several factors that may influence, and every modification of any of these factors is capable of bringing about a change of normal balance.

In the structure of bone, the trabeculae forming the framework, surrounding the medullary spaces have been proved to be the storehouse of calcium or the calcium reserve of the body. The medullary spaces are filled with a fibrous tissue which is very favorable to calcification, and as calcification increases, new trabeculae are formed, closing the areas of these medullary spaces until such a condition is reached that it is impossible to differentiate them.

With a decalcification we have an enlargement of the medullary spaces due to the loss of the trabeculae or separating walls, these spaces being filled with fibrous tissue, resulting in hyperplastic or spongy bone. These conditions are well illustrated by comparing the outer and the inner sheath of bone.

Research workers have given us certain facts in regard to the control of calcium metabolism which, if we but apply and utilize, would make the pathway of life for our patients much smoother and ease them into their declining years with at least a few of the normal teeth that God bestowed upon them.

If one will but stop to consider the histologic structure of the maxillary bones, their anatomic position and their functional activities, one can readily see just why they are very susceptible to any disturbance of mineral metabolism.

Most dentists agree that for ideal prevention in all phases of dentistry, the time to start correction is prenatal and should continue from then on. The dental arch during the first seven or eight years is a fair indication of what the dental arch will develop into as the patient reaches the age of maturity; at which time growth ceases, and we have a stabilizing of the supporting structure surrounding the teeth.

In a hypocalcemic condition after maturity, the decalcification and loss of osseous structure in the oral cavity are readily demonstrated through radiographs —a condition designated by a large variety of titles, at the present time called periodontosis. Before maturity, this condition manifests itself in the osseous structure with enlarged medullary spaces, thick trabeculae, hyperplastic bone, and irregularities. It is more difficult to check radiographically at this time, because of the activity of the growth hormone, but clinically it is easily recognized.

The similarity of these two phases of dentistry is very apparent with the exception that during the growth period we have the growth hormone to contend with, but its activity is slowed down considerably when maturity is reached.

The disadvantages in orthodontic work undertaken during the first two of these periods are absence of teeth for anchorage, lack of cooperation by the patient, and in some cases a delayed manifestation of inherited tendencies to endocrine disturbances.

For the most part, orthodontic treatment is started just prior to or during adolescence when nature is making her greatest demand for building material with cell activity at its height, anabolic activity predominating over the catabolic, besides the outside influences that might be brought to bear at this time.

Spacing these periods of accelerated growth are the intervals which are designated as transitional periods, when nature seems to rest to a certain extent, as far as growth is concerned, and to apply herself to correlating the results of her past efforts, allowing the other tissues of the body to catch up before making a new start.

That the hormones of certain glands of internal secretion exert an influence upon growth and development has been well established; and the condition that they create, if recognized and corrected, will materially assist the orthodontist in bringing his case to a successful conclusion.

The data that are being presented to the dental and medical world through the knowledge gained in the research laboratories are so conclusive and the results so apparent of the activities of these hormones derived from the glands of internal secretion in both organic and inorganic metabolism that we cannot overlook it. This applies to both the congenital and the acquired conditions. Hence, it can well be stated that the endocrines are vitally responsible for the maintenance of the cellular chemistry.

A mass of experiments has shown calcium to be most important in regulating the body's reactivity to various external impressions. While we look upon the skeletal system as the storehouse of calcium, one must not forget that it is vitally essential for correct cellular function of the soft tissues.

Keep in mind that the principle of cell selectivity is well established, that the bone cells have a faculty of appropriating calcium that muscle cells do not, and have a varying degree of calcium hunger depending upon age and other circumstances. Sluggish cellular activity causes a toxemia of which acidosis is an invariable part. The abnormal cellular break-down products, if not actually acid, are amines that act as do the amino acids and deplete the body's reserve of alkalies.

Toxic conditions of all kinds exert a strain on the endocrines, and these abnormal demands over a period of time may cause these organs to become exhausted and present a clinical picture which we should be able to recognize. Patients with a congenital endocrine disturbance are much more susceptible to a dysfunctioning of that particular gland.

It has been demonstrated that the endocrine glands are very closely related and the unbalancing of the function of one is very liable to affect the action of others, that they seem to work in groups—some in cooperation, inhibitive in action to others, maintaining what is called the endocrine balance, similar to what the dietitian would term a balanced diet. Numerous writers have considered the close interrelation between the internal secretions and have demonstrated that certain of these secretions are cooperative while others are antagonistic.

In the body every motive force is balanced by a retarding force, and this nice equilibrium is quite essential to the proper regulation of the numerous cellular functions. The endocrine balance is evidently maintained by a cooperation of different groups of endocrine glands that enable the physiologic processes to go on smoothly.

Therefore, when endocrine defects are known to exist, it is wise to look for acidosis or demineralization.

All glands of internal secretion influence every case of orthodontia either directly or indirectly through their control of growth and metabolism.

In the pituitary, the growth hormone secreted by the anterior lobe seems to be the controlling factor in promoting growth and development. A hyperfunctioning of this gland tends to develop large, fairly well shaped jaws with abnormal spacing of teeth, especially the anteriors, due to the fact that these teeth are fully developed while bone growth still progresses. Lack of this hormone will cause stunted growth and development, correspondingly small jaws and teeth, fairly well formed and delayed dentition.

In hypothyroidism we have retarded growth and development with a high percentage of abnormalities and delayed dentition, also a very noticeable hyperplastic condition of the osseous structure. This can, in all probability, be accounted for by the acidosis found in all cases of hypothyroidism. Hyperthyroidism is favorable to the orthodontist. In the majority of the congenital types there are well shaped, well developed jaws and teeth, and good calcium metabolism. If during adolescence through faulty diet or illness the osseous structure becomes hyperplastic resulting in a deformity of the oral cavity, we find these patients responding very readily to treatment when the condition is corrected.

It is certain that the parathyroids control the mobilization of calcium, placing it in circulation, as it were, to be utilized by the different tissues, maintaining the normal calcium balance. In hyperfunctioning, the calcium is mobilized from the skeletal structure, and eliminated, bringing about a hyperplasticity of the bone during the growth period or decalcification after maturity.

The gonads, through their inhibitory action on the growth hormone, exert a definite influence on calcium metabolism. A hyperfunctioning tends toward early maturity, early closure of the epiphyses, and though favorable to the orthodontist is detrimental to the patient in later years. A hypofunctioning is unfavorable, as the inhibitory factor on the growth hormone is lacking, thus failing to give nature an opportunity to consolidate the work that has already been accomplished.

"Apparently the thymus is an organ of infancy, and because of circumstances the physiology of the thymus has had to be studied largely in connection with its abnormalities. This is apparently one of the reasons why there is still so much difference about the fundamentals." (Harrower.[2])

Quoting from Pappenheimer,[3] "The pathologic changes, aside from the extreme inanition, are most striking in the bones, although alterations, possibly secondary to the general nutritional disturbance, are described also in the central nervous system. The essential change in the bones appears to be a defective calcification associated with increased resorption. The essential fact that the thymus exercises an important influence upon the proper development of the skeleton, seems to be definitely established."

The course that the calcium takes through the body and the way it is utilized and disposed of, make an interesting study. In normal diet there is a sufficient quantity to maintain a normal tissue balance under ordinary circum-

stances. A certain percentage of the intake is acted upon by the acids in the upper alimentary tract, undergoing a chemical change, making it possible to be absorbed into the blood stream—the rest passing out through the intestinal tract, alkalinizing the waste products. The calcium absorbed in the upper bowel is about 25 to 35 per cent of the intake, and is the portion that is utilized by the body tissues. A knowledge of its retention and fixation in the osseous structure, of its mobilization and the sources of elimination, is of prime importance.

The degree of severity of the demineralization governs the condition existing in the osseous structure. The resultant effect of local influences depends upon the condition of the osseous structure.

"Remineralization can be brought about in two ways: (1) by encouraging a better metabolism, and (2) by actual administration of the alkaline mineral salts. Unfortunately alkaline therapy does not interfere with either of the two common underlying causes—the initial difficulty and the endocrine reaction to that difficulty." (Harrower.[4])

The principal factors controlling mineral metabolism are diet, glands of internal secretion and ultraviolet ray.

The close association of the endocrine hormones with the vitamins is very apparent, and the application of both in conjunction with ultraviolet irradiation makes the ideal therapy.

The condition existing in the osseous structure of the oral cavity where we find irregularity or abnormal development is similar to that of rickets in children and osteomalacia in adults. It has been established that this rachitic condition can be produced in the skeletal system by a diet deficiency in either calcium or phosphorus or by a disturbance of the calcium phosphorus balance. This condition can be improved to a limited extent by the administration of acids or by improved diet, but can be restored to normal by the application of ultraviolet therapy. Experience has shown that the results obtained by ultraviolet therapy in this condition are so effective that, even with a rachitic diet, there will be an assimilation and retention of minerals in the skeletal system; thus proving conclusively that ultraviolet irradiations are the all-important factor in the retention, assimilation and the establishing of the calcium phosphorus balance in the body.

It is my belief that if it were possible to recognize or gauge the peak of the adolescent period and start the mobilization of teeth at this time or just prior to it, when the osseous structure is in its most hyperplastic state, getting the teeth into position so that advantage may be taken of the closing stage of adolescence, it would greatly facilitate progress; for it is at this time that the gonads are exerting their inhibitory effect on the growth hormone, causing a slowing down of growth and development with a consequent solidifying and stabilizing of the osseous structure. Thus the orthodontist would be timing his work so as to take advantage of the normal functioning of the glands of internal secretion to the fullest extent. It is at this point that if we will apply our calcium therapy with ultraviolet irradiation, the time required for retaining appliances, waiting for nature to fixate the teeth in position, will be materially shortened, and the results will be more permanent.

Orthodontia, preventive dentistry, periodontosis, all hinge on this alluring, fascinating, often too little considered subject, mineral metabolism and its controls—diet, glands of internal secretion and ultraviolet ray. Each of these control factors is of vital importance and should be taken into consideration in the study and manipulation of the osseous structure.

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# THE ENDOCRINES AND ORTHODONTIA*

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I SHALL interpret my duty in this article to be that of relating endocrine activity to mineral metabolism and skeletal growth, and by so doing call your attention to the close association existing between the glands of internal secretion and the highly specialized field of orthodontia.

When we speak of the function of the endocrine system or glands of internal secretion, the term connotes to the average person a thing bizarre—rejuvenation, sex stimulation or abnormal fatness. Until very recent years we had not conceived of the importance of the endocrine glands in relation to mental and emotional characteristics, body growth and development, and mineral metabolism.

Before proceeding to the question of the relationship of endocrinology to the subject of orthodontia, let us review briefly how the idea of a gland of internal secretion first came into the human mind, and let us consider the facts which now have been organized into a single body of knowledge on this subject.†

A gland is a collection of biologic cells which manufactures substances intended for a particular effect upon the body economy. The effect may be either local or upon the body as a whole. Originally, a gland was defined as something in the body which possessed the function of producing a juice or a liquid mixture of some sort. A classical example is the salivary gland secreting saliva. The microscope has shown us that every gland is a chemical factory in which the cells are the workers. The product of the gland work is its secretion. Thus the sweat glands of the skin secrete perspiration as their secretion, the lachrymal glands of the eyes the tears as their secretion.

Man has been acquainted with these more superficially placed glands for several centuries. Until comparatively recently it was believed that the secretions of all glands were poured out upon some smooth surface like the skin or mucous membranes. This was supported by the discovery of the canal-like passageways leading from the gland to the particular surface where its secretion was to act. These secretory or excretory ducts are present, for example, in the liver, conducting the bile to the small intestine. It was Theodore Borden who first considered the possibility of a substance being secreted from a gland into the blood. He was a famous French court physician of the eighteenth century. Starting with observations on the characteristics of eunuchs and of spayed female animals, he formulated a theory that sexual secretions may be absorbed into the blood, may determine the male or female character of the organism and may set the seal of destiny upon the individual.

*Read before the Orthodontic Section at the meeting of the State Dental Association, Oakland, Calif., April 4, 5, 6, 1932.

†The author is indebted to Dr. Jacob Berman in his book *Glands Regulating Personality* for much of the material used in describing the early experimental work on the endocrine system.

The thyroid gland of the neck and the adrenal glands of the abdomen had hitherto not been classified as glands because they possessed no visible pathways for the removal of their secretion. Now, however, they were designated as glands of "internal secretion." There are certain other terms for the glands of internal secretion which are used interchangeably. They are spoken of often as the endocrine glands and as the hormone producing glands.

No inkling of their real importance to the body, of which quantitatively they form such a small part, was had until comparatively recent times. Henle, the great anatomist, calmly affirmed that these glands "have no influence on animal life; they may be extirpated or they degenerate without sensation or suffering in the least." Laënnec and Johann Müller dismissed them with equal brevity.

The experimental method, to the value of which biologists were just beginning to awaken, was destined to be the vehicle by which light would be thrown upon the question.

The testes of the male and the ovaries of the female were the first to be experimented upon scientifically. This was probably because sex and sex differences have always more or less obsessed mankind. The effect of loss of the sex glands upon the configuration of the body and the predominating constitution of animals, including human beings, have always attracted attention. The proverbs and legends of all nations are full of references to them. But up to the nineteenth century no controlled experimental work was ever carried out regarding them.

In 1849, Dr. Berthold of Göttingen carried out the pioneer experiment of removing the testes of four roosters and transplanting them under the skin of the same animals. By way of explanation—the testes in all animals have two functions, one of internal secretion, the other of making spermatozoa, which, by means of the spermatic duct, are conducted to the outside. Up to the time of Berthold, only this latter function of the testes had been recognized; the testes then had been identified only as a gland of external secretion. Now came Berthold with the theory that it was a gland of internal secretion as well; that is, that it gave off a chemical substance into the blood stream which accounted for the so-called male characteristics. Berthold's experiments succeeded admirably in showing these properties of the testes. He found that though the power of procreation was destroyed as a result of transplantation, the effects on the roosters were not the same as the effects on roosters whose testes were removed from the body completely. The animals whose testes were transplanted under the skin retained their male characteristics as regards voice, reproductive instinct, fighting spirit and growth of comb and wattles. On the other hand, the roosters whose glands were removed from the body completely very soon assumed the characteristics of the female: the voice became high pitched, the comb became small and colorless and limp, the spurs became smaller, the reproductive instinct disappeared, and there was no fighting spirit. Thus to Berthold belongs the honor of being the first experimental demonstrator who proved the reality of a gland with a true internal secretion, a secretion which has a definite influence on physical characteristics. His experiment showed also that a typi-

cal gland of external secretion could also have a function of internal secretion, a possibility never before considered. It was not until many decades later, however, that Claude Bernard, another Frenchman, succeeded in convincing the world of the importance of internal secretions. I have cited specifically the early work on the testes because it shows in a brief way the origin of this important new and almost startling field of medicine. The early work of discovery of the properties of the various glands is almost breath-taking in its fascination. Time will not permit my telling you much of the earlier history if I hope to tell you of the present work in relating glandular function to the subject under discussion.

You have probably learned to associate the density and shape of alveolar bone, and the hardness, size and position of teeth with certain physical types. In the field of endocrinology we have learned to classify in a general way physical types according to the particular gland concerned, either as a hypo- or as a hyperfunctioning organ. For example, there are the thyroid deficiency or hyperpituitary types, the castrate, the thymus types, etc. By such classification one can predict, with fair consistency, the length of the long bones, the shape of the skull, the size of the hands and feet, the texture of skin, the hair texture and its body distribution, fat distribution, size of genitalia and many other anatomic characteristics. By carrying this classification further we might be able to predict on the basis of endocrine make-up the general structure of alveolar bone and shape and spacing of the teeth. I would not claim that endocrine influence—largely a hereditary factor—should be held responsible to an unlimited degree for the determination of alveolar structure and its abnormalities. According to Doctor Korkhaus in the recent report of his work at Bonn, Germany, with both uniovular and biovular twins, the hereditary factor predominates only in the case of excessive overbite and mandibular protrusion. He found that in identical twins there was absolute conformity in these characteristics. With nonidentical twins, however, a slight variation could oftentimes be noted. The types of abnormalities due positively to hereditary influence being therefore limited, what are some of the most important factors to which the remaining abnormalities may be due? Chief among these is probably rickets. According to Professor Kantorowicz of Bonn, Germany, rickets in children produces from 30 to 40 per cent of all orthodontic malformations.

It is significant in this discussion to consider the fact that in the condition of rickets, the endocrine system may play an important part. Before the discovery of viosterol, the fact was noted that under similar conditions some children developed rickets and others did not.

Rickets is a disorder which begins at about the third and ends at about the eighteenth month of life. It is probable that the newborn infant has little of the protective antirachitic factor, and that the disturbance in metabolism designated as rickets begins during the first weeks of life. Its intensity and progress vary in the individual according to the influence of a large number of factors. Until comparatively recent times, it was thought that rickets resulted simply from a lack of calcium in the body. The later period, during which time experimental rickets has been so successfully produced, is distinguished by a shifting of empha-

sis from a deficiency of calcium to a deficiency of phosphorus. In view of the fact that approximately 95 per cent of the calcium in bone exists in the form of calcium phosphate, it seems remarkable, as Hess has pointed out, that greater attention was not earlier devoted to the phosphate ion. The decrease in percentage of inorganic phosphorus content of blood plasma in experimental rickets is the most constant finding. In rats this percentage decrease is from a normal of 6 to 8 milligrams per 100 c.c. of blood to 3 or 4 milligrams. In general, it holds true for experimental as well as for infantile rickets, that the reduction in inorganic phosphorus parallels the intensity of the rachitic process.

When it was considered that the lack of calcium in the body was responsible for the production of rickets, it was thought that a deficiency of hydrochloric acid in the stomach was responsible for bringing this deficiency about, the supposition being that hydrochloric acid was necessary to break down insoluble calcium salts, thereby promoting more complete absorption. Many observers believed that faulty absorption was brought about when the diet was high in fat content, since more calcium was required for the excretion of excess fatty acids. Since it can be shown that the production of rickets is—within certain limits—independent of the percentage of calcium in the blood stream, these theories are no longer tenable.

It has long been observed that sunlight is beneficial in both the prevention and the cure of rickets, but the mechanism has never been well understood. Since the discovery of irradiated ergosterol (viosterol) and its wide and highly successful use, both preventively and curatively, it is thought by many that sunlight irradiates ergosterol in the skin and sets it free in the blood stream. Irradiated ergosterol, or viosterol, is thought by many to act as a catalytic agent resulting in the fixation of calcium and phosphorus at the epiphyseal ends of the bones. Other observers feel that its rôle is that of establishing the proper ratio between calcium and phosphorus in the blood stream. Whatever its mechanism, this new therapeutic agent has been found to be fairly reliable in the cure as well as in the prevention of rickets.

Kantorowicz and others believe that through the use of viosterol the incidence of rickets in children can be practically controlled. This belief I can accept with qualifications. There seems to be considerable variation among children as to the readiness with which they respond to the action of viosterol. In one case, chemical factors apparently come into play facilitating the action of viosterol; in another case these factors seem to be lacking. Eventually, I believe, we must look upon the use of viosterol as supplementary to a regulation of the inherent mechanism of calcium and phosphorus metabolism.

Calcium metabolism is quite definitely known to be regulated, in the last analysis, by the endocrine system, and more particularly by the parathyroid glands. According to J. C. Meakins, the function of these glands is "the maintenance of the calcium content of the blood plasma at a definite level, and the control of the calcium balance of the body. Moreover these glands have an important function in regulating calcium metabolism of the fixed tissues, particularly the osseous tissue.

"The term 'parathyroid tetany' is a condition which occurs subsequent to

the removal, injury or degeneration of the parathyroid glands, and is characterized by increased mechanical or electrical excitability of the neuromuscular system, and muscular hypertonicity, leading to painful spasmodic contractions of the muscles of the limbs, trunk, larynx, diaphragm, bladder and bowel. The calcium content of the blood is decreased."

When there is a condition of hyperparathyroidism, such as occurs with parathyroid tumors, the clinical picture usually presents generalized osteitis fibrosa, high serum calcium, a tendency to hypotonicity and hypoexcitability of the neuromuscular system, a pronounced rarefaction of the bones with fractures and sometimes cyst formation; and a resorption of the cortices and spongiosa. This condition presents the picture just opposite that of rickets and osteomalacia—which conditions indicate a cessation of calcification.

In determining bone integrity, there should be kept in mind, therefore, these two possibilities—namely, decalcification, due to production of excessive hormone in the body, and lack of or cessation of calcification, due to a vitamin deficiency. In order better to visualize the mechanism by which these bone conditions are brought about, let us consider certain experimental work which throws light on the manner of calcium and phosphorus absorption and their subsequent distribution.

This phase of the problem more specifically interests us, since the disturbances with which you are most concerned have to do usually with the mechanism controlling the laying down or distribution of calcium. The normal calcium content of the blood stream is 9.0 to 11.0 mg. per cent. This is sometimes referred to as "ionic" calcium, and it tends to remain at this level under ordinary conditions. That the parathyroid glands are the chief regulatory mechanism in maintaining this level has already been pointed out, but other factors operate to help in this same balancing mechanism. Since the discovery of viosterol by Windaus, much work has been reported concerning its action on blood calcium. Jones, Rappaport et al. have demonstrated that by feeding concentrated solutions of viosterol or vitamin D and a diet normal in calcium, a pronounced hypercalcemia of the blood serum will result within two weeks. If the diet is calcium free, however, then feeding an excess of viosterol will cause very little elevation of serum calcium. We see then that when an excess of parathyroid hormone exists in the body, calcium is mobilized in the blood serum at the expense of the bones, yet when such a parathyroid condition does not exist, any excess of viosterol will take little or no calcium from the bones. In the latter case viosterol will only mobilize whatever calcium may be contained in the food. Recently Hess, of New York, has reported that the effect of viosterol in raising the serum calcium level was through the parathyroids. He found that in monkeys and dogs fed large doses of viosterol the serum calcium level frequently rose to 13-16 mg. per cent or to a pronounced hypercalcemia. After removal of the parathyroids, however, large doses of viosterol failed to raise the calcium above the tetanic level. In the absence of the parathyroids it is necessary to give a diet high in calcium and heavy doses of viosterol over a long period of time in order to avoid tetany.

In the January, 1932, issue of the Journal of Clinical Investigation, Bauer,

Marble et al. have reported significant findings concerning the effect of viosterol on calcium absorption from the intestine in cases of parathyroid deficiency. They first placed normal individuals on a low calcium intake and gave each person an active parathyroid extract. There occurred a fall in the serum phosphorus, an increase in urinary phosphorus excretion, a rise in the serum calcium, an increased urinary calcium excretion and no effect on the fecal excretion of either phosphorus or calcium. The administration of viosterol in adequate doses to the same normal individuals on a low calcium diet was found to cause a similar increase in the urinary excretion of phosphorus and calcium; this, however, was accompanied by a decrease in fecal phosphorus and calcium. There occurred only a slight elevation of serum calcium and little if any elevation of serum phosphorus. Parathyroid extract appears, then, to mobilize calcium and phosphorus from the bones, since the unchanged calcium and phosphorus fecal content eliminates the possibility of the rise in serum calcium and phosphorus being due to more complete absorption. The effect of viosterol on the other hand, seems to be that of causing calcium and phosphorus to be more effectively absorbed from the intestinal tract, this being indicated by the decrease in calcium and phosphorus fecal content. Parathyroid is seen to be much more effective than viosterol in raising the level of serum calcium and phosphorus in the normal individual.

The investigators then chose patients known to be deficient in parathyroid function to the extent of mild parathyroid tetany. The calcium intake of these patients was varied, and viosterol was given in various dosages. Their conclusion was that viosterol caused absorption of calcium from the intestine even in the face of lowered parathyroid function, tending to disprove Hess's theory that viosterol exerts its influence through the parathyroids. They concluded further that the beneficial action of viosterol therapy on patients with parathyroid deficiency is apparently dependent upon the calcium intake and not upon activation of any remaining parathyroid tissue.

While we conclude that viosterol will relieve parathyroid tetany by bringing the serum calcium up to normal, it has not been proved that it will cause calcium to be laid down properly in various parts of the body. This function is apparently dependent upon the integrity of the endocrine system.

Another endocrine factor to be considered is lowered metabolic activity. It is pretty well established that the principal regulator of metabolic activity is the thyroid gland. In any condition of bone softening or bone fixation the metabolic rate should be determined. If the metabolic rate is lowered, the rate of absorption of lime salts from the intestine may likewise be lowered. The factors for its proper distribution in the body will probably also be reduced in function. The effect is liable to be a hypocalcemic condition of alveolar bone, loosening of teeth and a predisposition to the development of caries.

I have dwelt at length on the various chemical factors which enter into the conditions of bone integrity because these factors are, it seems to me, of basic significance.

Through the proper understanding of the processes by which the vitamin and endocrine secretions exert an influence on calcium metabolism, we can better

visualize the various types of hypo- and hypercalcemic bone, hypercementosis and eburnation. It becomes more and more obvious that the regulatory mechanism maintaining bone integrity is a finely balanced chemical process. When departures from the normal are observed in alveolar bone structure, every opportunity should be taken to ascertain the feeding history, childhood growth and development, childhood diseases, particularly those of the deficiency variety, digestive disturbances and evidence of endocrine dysfunction in the family.

I wish now to call your attention to the relationship between the endocrine system and the skeletal configuration particularly as this applies to the shape of the mandible and maxillary process. Many investigators would assign to the endocrine glands the leading rôle in determining the complete constitution of man. Certainly we must assign to them a large share of responsibility in the production of those structural characteristics which we speak of as family likenesses and racial resemblances, and in so doing we bear witness to their hereditary transmission.

In considering now the structure and contour of alveolar bone, it is necessary to refer to the question of malformations. Many of these conditions are hereditable—such conditions, I mean, as would fall under the ordinary classification of variation. Others, which may be called malformation by defect, are due to failure to complete some structure. To this class belong hare-lip, cleft-palate and spina-bifida. Still others are malformations by excess, such as extra fingers and toes; while still others, such as branchial clefts are vestigial remnants. Reference has already been made to malformations brought about through disturbance in bone calcification such as rickets and osteomalacia.

As was pointed out earlier, Korkhaus contends that only overbite and mandibular protrusion or prognathism can be classified as predictable hereditable characteristics. Prognathism or the acromegalic profile is generally looked upon as a condition of oversecretion of the anterior lobe of the pituitary gland. The acquired acromegalic features hardly concern us in this discussion, since this disease is not commonly one of childhood. Suffice it to say that there is in acquired acromegaly a rapid bony growth of both the mandible and the maxilla, abnormal spacing of teeth and enlargement of the extremities. However, the child born with acromegalic features is one of your principal orthodontic problems. He represents a hereditary hyperpituitary skeletal make-up without acromegalic disease. There is a corresponding familial overgrowth of the other parts of the skeleton. In cases of infantile growth due to a deficiency of the pituitary growth hormone, correspondingly small alveolar bones and teeth and delayed dentition will ensue.

Marked hypothyroidism will also bring about retarded growth and development of the skeletal system as well as delayed dentition. In this condition the retardation is due to inability on the part of the body to lay down lime salts in the bones. The bones are hyperplastic, the epiphyses do not unite, and teeth do not erupt.

## CONCLUSION

In conclusion, allow me to stress the points which I feel that you should bear in mind.

First, consider that our body structure and its physiologic functions are regulated by a highly specialized and finely balanced chemical mechanism. There is abundant experimental evidence indicating that the endocrine glands play a leading rôle in this function.

Second, that on the basis of classification according to endocrine types, that is hypothyroid, hypogonad, hyperpituitary types, etc., we are able to predict with reasonable accuracy certain anatomic characteristics, such as length of long bones, hair distribution, skin texture, etc. There is some evidence to indicate that the structure of alveolar bone, and the shape and spacing of teeth might be predictable on the basis of such classification.

Third, that Korkhaus cites evidence indicating that overbite and mandibular protrusion are the only characteristics of form and contour of alveolar bone which are definitely hereditary. That these two characteristics are predictable on the basis of the endocrine make-up of the individual.

Fourth, that rickets in children produces from 30 to 40 per cent of all orthodontic malformations. That the endocrine system through its rôle as the principal regulator of calcium metabolism may play an important part in predisposing infants to rickets.

Fifth, that viosterol or irradiated ergosterol is highly successful both preventively and in the treatment of rickets, but that it is probably secondary to the endocrine system, particularly the parathyroid glands, in the regulation of calcium metabolism and proper laying down of this element. That viosterol in therapeutic doses promotes absorption of calcium from the intestine while the parathyroids mobilize calcium from the bones.

Sixth, that lowered thyroid function also causes deficient calcification through lowered metabolism.

Seventh, that the endocrine system, and particularly the anterior lobe of the pituitary, controls, in large measure, the skeletal configuration of man, and that the shape of both maxilla and mandible is regulated by this factor.

Eighth, that malformations by defect, excess, or vestigial remnants are not significant in this discussion.

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## CASE REPORT*

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THIS case is presented to show a most unusual condition resulting from a somewhat unusual accident.

A boy eight years old was presented by his parent with a slight swelling on the right side of the mandible in the region of the first molar.

*History.*—Some thirty days prior to this time the parent had "extracted" the loose mandibular right deciduous molar. An hour or so after the tooth was extracted the boy went out to play with his air rifle, and, as is the custom or practice of many boys, he placed the lead BB shot in his mouth to facilitate loading the gun. Two of these shot found their way into the socket of the extracted

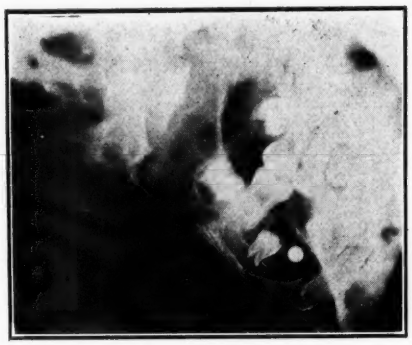

Fig. 1.

deciduous molar, and the boy was unable to get them out. Fearing the wrath of his parents the boy said nothing about the shot, there apparently was no pain, and the incident was almost forgotten. Sometime later the boy's mother was looking at his teeth and noticed that the socket where the deciduous molar had been extracted had not closed up; whereupon the boy was brought in for examination.

*Examination* revealed an opening one-quarter inch in diameter where the deciduous molar had been extracted, the tissue about it looked normal and healthy, there was considerable bulging of the bone to the buccal side and close observation showed some dark object deep in the cavity in the jaw. Extraoral x-ray picture (Fig. 1) showed a round metallic object in the jaw, and when the boy was questioned as to how the object might have gotten into the jaw, he told the story of the shot, much to the chagrin of his mother. Fig. 1 shows a large cavity in the jaw approximately three-quarters of an inch square, extending

*Report given before the Illinois State Dental Society.

distally from the first premolar to and including the mesial root of the first molar. About one-quarter of the cavity extending upward from the lower border was filled with a rather heavy tissue, within and attached to this tissue was the developing permanent second premolar.

*Treatment.*—Under novocaine anesthesia the shot and the tissue mass were removed, with the exception of a small area to which the second premolar was attached. Examination of the mass showed it to be a fibroma. The cavity was

Fig. 2.

Fig. 3.

lightly packed with a dressing of gauze into which was incorporated Wards Wonder Pak. This dressing was changed every four days for a period of three weeks. Ultraviolet radiation (carbon arc) was given every day for ten days, and then twice a week for thirty days. Recovery was uneventful.

An extraoral x-ray picture (Fig. 2) shows the progress of bone formation in the cavity sixty days later. Note that the second premolar has not been exfoliated; however, note that the first premolar has tipped or fallen distally. About ten months after operating, a simple appliance was placed on the first

molar and first premolar, and the tooth was tipped back into its proper position. A small intraoral film (Fig. 3) shows the area seventeen months later; note that the second premolar has erupted into the line of occlusion and that there is a gradual development of its root taking place. Note also that the cavity has entirely filled with normal bone. Incidentally it might be mentioned here that both molar and premolar react to vitality test.

## QUESTIONNAIRE*

1. Have you a chair in children's dentistry?
2. If so, who holds the chair?
3. Have you a special lecture course in pedodontia?
   (a) If so, number of lectures, etc.
4. Have you a separate children's dental clinic?
   (a) If so, what are your clinical requirements?
5. Do you give any clinical instruction whatever in children's dentistry?
   (a) If so, what coordination has it with teaching of orthodontia?
6. Remarks:

In the compilation of this report it is arranged so as to give the status of children's dentistry as reported in 1929 with the present situation for 1932 for purposes of comparison.

In 1929 twenty-nine schools sent in replies to the questionnaire, and this year (1932) thirty-eight replies were received, with the following results:

*Question 1.*—Have you a chair in children's dentistry?

| In 1929 | | In 1932 | |
|---|---|---|---|
| Affirmative | 6 | Affirmative | 13 |
| Negative | 23 | Negative | 25 |

*Question 2.*—If so, who holds the chair?

Not of importance in this report—though the replies were complete in naming the instructor and show a great deal of interest being given to children's dentistry.

*Question 3.*—Have you a special lecture course in pedodontia?

| In 1929 | | In 1932 | |
|---|---|---|---|
| Affirmative | 18 | Affirmative | 24 |
| Negative | 11 | Negative | 14 |

In 1929 the number of schools where special lectures were given under the department of operative dentistry was 6.

In department of preventive dentistry 3, and in the department of research 1.

In other words, of the 18 schools in 1929 giving special lectures in children's dentistry: in 6 schools these lectures were given in operative department; in 3 schools in the department of preventive dentistry; in 1 school in the department of research; while 8 schools had a special course under its own auspices.

Of the schools that have no special lectures, 3 stated that lectures in children's dentistry were given by the operative department. Twenty-one schools in 1929 gave lectures in children's dentistry.

*Number of Lectures Given in 1929.*—11 schools replied as follows:

| | | | |
|---|---|---|---|
| 16 lectures | 4 schools | 8-16 lectures | 1 school |
| 18 lectures | 1 school | Several lectures | 2 schools |
| 33 lectures | 1 school | Not definite | 1 school |
| 6 lectures | 1 school | | |

*Questionnaire sent out by the American Society for the Promotion of Dentistry for Children.

In 1932 the number of schools where special lectures are given under the department of operative dentistry is 10; in the department of oral hygiene and preventive dentistry, 4; and in the department of orthodontia, 2.

Or, stating the situation another way—of the 24 schools in 1932 giving special lectures in children's dentistry: in 10 schools these lectures are given in the operative department; in 4 schools these lectures are given in the department of oral hygiene and preventive dentistry; and in 2 schools these lectures are given in the department of orthodontia—while 8 schools have a special course under its own auspices.

Of the 14 schools that have no special lectures, 7 reported that lectures in children's dentistry were given by the operative department; 1 by the orthodontia department; 1 by preventive dentistry, and 1 by the clinical pedodontia staff. Therefore, thirty-four schools do give lectures in children's dentistry, out of the thirty-eight that replied to the questionnaire.

*Number of Lectures Given in 1932.*—24 schools replied to this question as follows:

8 schools give 16 lectures
4 schools give 8 lectures
2 schools give 22 lectures
1 school gives 64 lectures
1 school gives 35 lectures
1 school gives 33 lectures
1 school gives 32 lectures
1 school gives 32 lectures and 64 hours' laboratory
1 school gives 25 lectures
1 school gives 24 lectures
1 school gives 11 lectures
1 school gives 10 lectures
1 school gives 6 lectures

and 14 did not reply to this question.

*Question 4.*—Have you a separate children's clinic?

| In 1929 | | In 1932 | |
|---|---|---|---|
| Affirmative | 13 | Affirmative | 16 |
| Negative | 16 | Negative | 21 |
| | | No reply | 1 |

*Clinical Requirements.*—In 1929 two schools volunteered information of number of hours devoted to children's work, as follows:

1 school 192 hours
1 school 66 hours

In 1932 fourteen schools stated their clinical requirements, as follows:

| | | POINTS |
|---|---|---|
| 1 school for juniors— | Prophylactic treatments | 2 |
| | Cement bases | 2 |
| | Cement fillings | 2 |
| | Amalgam fillings | 15 |
| and for the seniors— | Prophylactic treatments | 2 |
| | Deciduous root treatments | 10 |
| | Cement bases | 2 |
| | Cement fillings | 2 |

One school states the juniors are required to take 24 hours' lecture in pedodontia during the year, and 99 hours of pedodontia clinic. The seniors are required to take 99 hours of pedodontia clinic. One school states that each junior and senior student is required to care for at least one child throughout the school year as a minimum credit, but naturally cares for a number in his routine clinical hours in the infirmary during his last two years of training.

One school reports that each third- and fourth-year student is required to spend 36 clock hours in the children's clinic.

One school reports that each senior is required to earn 400 credits in addition to the general requirement for mouth examinations and extractions. The record for a single average senior for 1931 shows that he performed the following operations: 6 scalings; 5 treatments; 19 amalgam fillings; 4 cement fillings; 1 inlay; 1 gold foil filling.

One school requires 92 hours in special children's clinic, and a technic course of 11 hours is given. In this a special study of deciduous tooth anatomy and cavity preparation is made. A notebook is kept, and many drawings relative to the subject are made.

One school requires 70 unit hours for seniors, and 15 unit hours for juniors.

Two schools require junior students work three mornings each week, exclusively for children throughout the school year.

One school requires in operative dentistry—7 half days on children under thirteen years of age.

One school states that every student during his junior and senior years spend a total of four weeks in the children's clinic—2 weeks each year.

One school requires, in the junior year, 250 units; senior year, 200 units; approximately 3 completed cases junior year; and 2 completed cases for the senior year.

One school states that the seniors are required to do 15 operations and the juniors 5 operations.

One school requires of the juniors: 90 amalgams; 20 silicates; 10 cements; 1 pulpotomy; and of the seniors: amalgams; 40 silicates; 15 cements; and 2 pulpotomy, and a prophylaxis for every child treated.

Sixteen schools did not give their clinical requirements in children's dentistry, and eight stated theirs were included in operative dentistry.

*Question 5.*—Do you give any clinical instruction whatever in children's dentistry? If so, what coordination has it with teaching of orthodontia?

| In 1929 | | In 1932 | |
|---|---|---|---|
| Affirmative | 28 | Affirmative | 36 |
| Negative | 1 | Did not state | 2 |

In replying to the second part of the question, in 1929, sixteen schools stated active cooperation between the department of orthodontia and children's dentistry service. Four schools indicated no coordination, and one stated they hoped to develop it.

In 1932 replies to the second part of question five, the following is noted: 26

schools state varying degrees of coordination between the teaching of children's dentistry and orthodontia; 8 schools state no coordination; 3 did not reply to the question; and one school hopes to develop a coordination between the two subjects in the near future.

In analyzing these results we find that while only thirteen schools of the thirty-eight that sent in replies have a chair in children's dentistry, and only sixteen have a special children's clinic, thirty-six give clinical instruction in this subject, twenty-four have special lecture courses, and thirty-four give lectures in the subject.

Unquestionably greater interest is being taken in the subject of children's dentistry on the part of our teaching institutions, and more attention is steadily being devoted toward developing special clinics; special lecture courses, and establishing definite clinical requirements in this subject.

The trend seems to indicate a general move in our schools toward developing a "consciousness in children's dentistry" by teaching the subject sufficiently as a distinct unit separate from the departments of orthodontia, operative dentistry, oral hygiene, etc. Also, there seems to be an indication of earnest endeavor to coordinate the teaching of the subjects of children's dentistry and orthodontia, though at present it is evident that greater attention can be devoted to this phase of these subjects.

To indicate that many schools are not overlooking the importance of this, the following is taken from the replies to this question:

One school states, "We are establishing a children's clinic, which will be correlated with orthodontia and also with general instruction about the care, value, and uses of the teeth, also in regard to diet. . . ."

Another states, "The instruction in children's dentistry includes observation of those factors which might be responsible for the necessity of orthodontic treatment. In case orthodontic treatment is necessary the work is completed by the department of orthodontia in cooperation with the department of children's dentistry."

One states, "Restorations are completed in children's clinic and the patient is then referred to orthodontia, so that students may see the same patient in both departments. The children's clinic is associated with the pediatrics department of the university's research hospital."

Another school reports, "Special stress is made on children's dentistry by those lecturing on operative dentistry, and an effort is made to carry this out in the clinic. If in orthodontia clinic charts show dental defects in children's mouths, they are sent to operative clinic to have necessary work done before starting orthodontic treatment."

Another reply states, "The director of this department spends two half days in the children's clinic, and there are three half-time assistants. The orthodontia service is given in the same wing of the building and the two services are closely coordinated."

Another reply states, "Dentistry for children here at —— is associated with both operative dentistry and orthodontics as far as pedodontia and child psychology and related subjects are concerned. Restorative work is treated and regarded

as a part of the operative dentist's duties and obligations, and students are taught to regard this part of their work as of primary importance in the practice of dentistry."

Another reply states, "We are contemplating establishing a children's clinic intimately connected with the department of orthodontics and the department of pediatrics of the university —— medical school. . . ."

Many other replies were of similar nature, but too much space would be required to report all of them.

In making a report on the status of children's dentistry, it seems fitting and proper to recognize and mention three definite endowments made to the cause of children's dentistry in the recent past.

Dr. Howard S. Lowry, of Kansas City, in 1930, under the terms of his will, left $67,000 of his estate for the purpose of dental care for children. This clinic is being operated by the Kansas City-Western Dental College, through an arrangement with the college.

In March, 1931, Colonel Joseph Samuels, of Providence, R. I., established "The Joseph Samuels Dental Clinic for Children," as a part of the Rhode Island Hospital at an outlay of over $300,000 and recently has given another $10,000 to the clinic.

Also in 1931, Dr. DeLos L. Hill, of Atlanta, provided in his will for a gift of $50,000 to the Atlanta-Southern Dental College for the "DeLos L. Hill, Jr., Children's Clinic" in memory of his son.

These endowments are interesting to the members of this Association as they show a public interest in the subject.

The benefactions of the Forsyth Brothers, Mr. Eastman, Mrs. Montgomery Ward, Senator Couzins, Murry and Leonie Guggenheim, and others, in which children's dentistry shares, are well-known, and all of which seems to bespeak the importance attached by both the public and the profession to dental care for the thirty or forty million children of our nation.

In the submission of this report there is no attempt on the part of your committee to make recommendations of a specific nature feeling that this matter should come from the Association as a result of general discussion.

We do feel gratified and very much appreciate the full and frank manner in which the deans of the schools have responded and are showing their interest in the subject of children's dentistry.

Respectfully submitted,

H. E. Friesell,
LeRoy M. S. Miner,
A. R. McDowell, Chairman, College Committee.

# TEACHING THE CARE OF CHILDREN'S TEETH*

WALTER T. MCFALL, D.D.S., MACON, GA.

THE child is demanding and needing the attention and advice of the dental profession more today than ever before. We must realize that the only way we can cope successfully with the existing prevalence of dental defects and the resulting toll in retarded mentality, diseased and impaired bodies, is by preventive measures which must begin early in life. While much splendid work has already been done, seeds have been sown that will surely bring forth a bountiful harvest in future generations, there still remains much to be done, many thousands to be taught and helped. We cannot change public sentiment all at once, nor can we get legislation without first preceding that by education. We must realize that our duty and responsibility to the nation and state are not confined to the care of those diseased conditions of the teeth and mouth. This and only this we have been doing, but we must be concerned as to the best possible health of our communities as far as we can. Though none of us received very much instruction on the subject in our dental colleges, we soon realized that public education is a most important part of any dentist's life work, and that we must keep up, be progressive, informed, and fully cognizant of our responsibility, if we are to serve our best.

The very rapid progress, attention, and interest given to mouth hygiene work in the last few years are not to be regarded merely as an educational reform, but more as the correlating of a universal realization of the paramount importance of preventive measures in the conservation of natural and human resources. This regard for waste is, in fact, the principal issue of our entire economic, industrial, political, and educational institutions. In many ways society is enlarging its interest in the individual; more and more we are being forced to realize that our greatest national asset is not reckoned in resources, in power, in possessions, but rather in the health of the children who tomorrow must become healthy, useful, happy American citizens. Humanitarian foresight, restrictive measures, regards for the rights of the masses, and large social and health undertakings are everywhere being actively manifested.

The members of all the professions of the healing art are being sought out and looked to as leaders, to guide, teach, and materially help others to be healthy, happy, and useful, to be more concerned with the vital part we all have in shaping human destinies. We are fast coming to accept as our symphony, that we, as members of this present generation, are living not only for ourselves but also for those generations that are to follow. Those forces which make or mar the destinies of man are more amenable to control today than they were twenty years ago. The present development of industrial processes, the various sciences of conservation give us hope that at least the worst conditions of poverty, selfishness and igno-

*Paper read before the Richmond, Va., Dental Society.

rance are being done away with. The amazing progress of medicine demonstrates that most of our dreaded ills can be overcome and many others eliminated by simple, preventive means; and finally the laws of heredity when fully known and heeded are surely capable of raising the mental, moral, and physical endowment well above where it now stands. I repeat that much progress and development are apparent; and while life has been added to, some eight years in the average man's life, there remains a vast amount of ignorance pertaining to health and disease. The startling researches of a number of scientific men are more than offset by the ignorance of thousands of people who still spend hard earned money for patented tuberculosis cures, by those who continue to use liverwort for jaundice because the leaf resembles the human liver, by those who treat infectious diseases by suggestion, by the tens of thousands who still believe the care of deciduous teeth is not necessary, that these teeth should not be preserved and saved until time for normal replacement, who have been told "for every child a tooth"; who believe a body can be healthy and nourished when food is taken into the stomach through a mouth which is filled with filthy, decaying, sore teeth harboring putrefying food and germs, where pus of the most virulent nature is found; who believe that infected tonsils, glands, and ears, and impaired masticatory efficiency do not cause a great handicap to a child in school and throughout life. We must work early and late in answer to this appalling challenge and weighty responsibility that comes to every man of us.

I feel this obligation tremendously. I wonder whether we all fully realize and appreciate just what our part is and should be in our respective communities. Do we realize, as a great educator has said, that every profession carries a responsibility, that, "Dentistry is a profession, not a trade, not an occupation, but a profession with a great responsibility that is on each of us to keep the mouths of America clean and healthy." We cannot do this by merely displaying our sign and having a dental degree, or by treating, filling, and extracting teeth for those who come to us; but we can and shall fulfill our mission and hopes by living the Golden Rule, by doing more giving and not so much getting, by being the men and leaders to whom the call so pathetically and clearly comes in this age in which we are living. "Progress is the law of the universe." Any one who will not bend his will to this law not only handicaps himself but grievously wrongs and deprives all those whom he should serve, of their rightful part in all which is highest and best.

Never has there been such a call on dentistry as today. We have many opportunities to help. We serve the parents, the young children and the older children; we are called upon to aid medicine, and I believe I am totally correct when I say that we are able to help more today than ever before. No reputable physician undertakes to relieve or treat a patient suffering from some systemic foci, from maladies of the lungs, heart, or kidneys, without consulting an honest, well-informed and deeply conscientious dentist; without having his patient given an oral correction by a man whose efforts show a personal interest and pride in his services and professional ability.

Realizing that health and its maintenance are of paramount importance, that the nation is no stronger than its weakest child, that "knowledge without

health cannot profit us,'' we have waged an intensive, active, and popular campaign to eliminate dental defects, prevent infectious diseases, decrease the number of children being absent from school, failing in classes, and being unnecessarily retarded and impaired for future life. It has been my effort to educate the child in the schools—first, through his teacher in the classroom, second, through the parents in the community, mothers' and parent-teacher clubs; third, through the actual treatment and reparative work in the dental clinic.

I have said it was my hope to reach the child first through his teacher. We must all realize that preventive dentistry naturally divides itself into two main classes, educational and reparative. The influence, opportunity, and ease with which a teacher can put over an idea in a classroom are nothing short of remarkable. Children whose parents have tried to make brush their teeth, eat and chew slowly the proper kinds of food that make for strong bodies and teeth, insist upon and do, as a matter of fact, all their teachers tell them to. If one is going to educate another, it is assumed that he himself is educated. With this point in view I have given to each teacher an outline which is especially adapted to her respective grade, and have explained just what and how to teach her children relative to their teeth and health. This outline is taught in the classroom every day for fifteen minutes, just as is any other lesson. The methods of instruction used are charts, songs, poems, books, stories, talks, lectures, movies, posters, exhibits, plays, drills, projects, and demonstrations. We have a health booklet for each child, and every morning an inspection is conducted and the findings are charted as to the health habits and rules, such as brushed hair, clean face and hands, teeth brushed twice the preceding day (night and morning), clean linen, twice weekly bath, drank milk, six glasses of water, ate green leafy vegetables, ate fruit, slept with windows raised, had a bowel movement, played outdoors, did not drink coffee or tea. Toothbrush drills are supervised and conducted twice monthly. All classroom work is supplemented by required compositions, essays, by the regular physiology and hygiene lessons, and special health work by the dentist, nutritional worker and teacher.

Secondly, through the parents, it has been my effort to reach the school child and also to help the preschool child and even the unborn child. I have tried to have as many parents as possible visit the clinic and classes, to see just how the children are served, to see the drills, projects, demonstrations and plays. I have spoken often before mothers, parent-teachers, and community clubs, and have tried to reach others by articles in the weekly newspaper, and always I have been stressing the importance of saving deciduous teeth and of growing strong teeth.

Strong, healthy teeth are the result of:

1. Good nutrition, with especial emphasis on attention to the health and proper foods of the expectant mother, the nursing mother, and of the preschool child and the school child.

2. Thorough mastication, which is a first aid to good digestion, and also is necessary for jaw and tooth development in early life and for maintaining healthy teeth and surrounding tissues all through life.

3. Adequate prophylactic and dental care. The teeth should be cleaned thoroughly and properly after each meal and before retiring. Clean a child's

teeth as soon as they appear. Regular visits to the dentist should be made beginning at two and one-half years. Special care should be given the deciduous teeth and the first permanent molars.

I have implored the cooperation and support of the parents in remembering and encouraging their children to eat proper foods, to chew slowly and thoroughly, to care for the mouth and teeth properly, and to adhere to all health habits which are taught. I have told the mothers of the part they have in building and assuring good teeth for their children; how diet affects teeth and bones; how bad habits such as thumb sucking, using pacifiers, etc., have a deleterious effect upon the mouths and respiratory tracts of children; how important it is to care for and preserve deciduous teeth until time for normal resorption and replacement; also just why the first permanent molars need special care and consideration at the time they erupt; how a child's progress in school is retarded and his health vitally affected from lack of care and attention to the mouth and teeth from infancy on through life.

Then thirdly, I have tried to teach the child the importance of and the proper way to care for his teeth and mouth in the dental clinic. Every precaution is observed to disabuse the child's mind of the horrors and pain of the dental chair; and from the interest manifested and the enthusiasm shown, I feel we have made a friend, booster, and teacher of each child in this great work of mouth hygiene. I believe children are the easiest and most appreciative patients we have to work for.

If a practitioner is unsuited by nature or temperament to care for children properly, let him at least be honest about it, admit it, and send them to some one who is well qualified and glad to serve them. In my practice, all work is done for permanence as far as possible, and a special effort is made to retain every tooth just as long as possible, provided it is not diseased or is not a detriment. Every operation is done with a great deal of pride, and each child treated as an individual and personal case, every effort is exerted to minimize pain by the use of new sharp instruments, burs and anesthetics. I believe in children, I believe in my profession and the high ideals for which it stands. I love little children and I feel that I am doing my best to answer the challenge, to uphold the responsibility of the profession.

If you would be a happier man, if you would be a more successful practitioner, if you would profit most—then serve.

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# *EDITORIALS*

## What Next?

THERE is a new order of things, both economic and professional, appearing rapidly and conspicuously on both the medical and the dental horizons, and this scheme of things involves the entire field of the treatment of human ills and promises a fundamental shifting of professional activities.

As a result of the report of the Committee on the Cost of Medical Care which was made recently, the community medical center has emerged as the high spot of the Committee's recommendation. The Committee delivered its report, the result of five years of research, before the National Conference on the Cost of Medical

Care at the New York Academy of Medicine. Five basic recommendations were made. They are, in brief:

That medical care be furnished largely by organized groups of physicians, dentists, nurses, pharmacists, and other associated personnel, centered around a hospital and rendering home, office and hospital care.

That all basic public health services be extended until they are available to the entire population, according to its needs.

That the cost of medical care be placed on a group-payment basis through the use of insurance or taxation, or both methods, without precluding the continuation of the individual fee basis for those who prefer it.

The demand being felt by society at large for professional service at modest fees has manifested itself in no uncertain terms in the appearance of various and sundry new plans, conspicuous among which are contract and corporate practice, health insurance, socialized medicine and dentistry, part pay clinics and lesser ideas. These various plans and innovations on their debut attracted only passing and indifferent attention; however, as the months have passed they have assumed much larger proportions and are now attracting much more than passing notice. We are forced to the acknowledgment that changes are here, fundamentally revolutionizing previous precedents, and whether we like it or not the situation must be squarely faced. The basic proposition that public health, including dental practice, is a matter of great importance and concern to the commonwealth, is upon us before we are hardly aware of it or ready for it. No doubt the increasing speed of approach of these changes may be accounted for, in a measure at least, as a "tail wind" which accompanies the great confusion and shifting trend of thought now in progress all over the world. Attend any gathering of physicians or dentists, or pick up any professional journal, and thumb its pages, and you are impressed by an obvious unrest and anxiety in regard to the professional economic status that may be interpreted as, perhaps, bewilderment.

At the recent meeting of the American Dental Association Dr. Herbert E. Phillips gave a most timely and appropriate paper which was generally regarded as in accord with modern dental trends. Dr. Phillips concluded his paper with this admonition: "Somehow means must be found within our profession for providing a clean, deep channel through which adequate dental service will flow to all of the people." His audience was plainly impressed by some of his remarks; for instance, the statement that 80 per cent of the people are without adequate dental service and something will have to be done about it within the profession, or it will be done by a mechanism set in motion from without. This movement from without is now with us, and is in the newspapers as well.

How this great shifting of the availability of dental service can be done from within the ranks of the profession is still a momentous question, and while several professional societies have taken strides for its solution, including the California State Medical Society and the Milwaukee County Medical Society, it is still a question, and suffice it here only to realize and understand that dentistry is standing on the threshold of probably the greatest transitional fundamental change in any epoch of its history. After the confusion of the present uncertainty has subsided, dental service will no doubt be provided in some manner for much wider brackets of society than is at present available because its status as a health measure is too

important to be ignored longer by the public, the commonwealth or the profession itself.

Dental service only for the chosen so-called 20 per cent of society is passing along with many other luxuries for the few, and dentistry therefore must readapt itself to the inevitable, to the ever changing conditions; and it follows that what is true of dentistry may be expected of its various specialties, including particularly the department of orthodontic practice. —*H. C. P.*

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OF INTEREST to orthodontists is an editorial, "Orthodontia for the Masses," in a recent issue of *The Dental Magazine and Oral Topics* which is published in England. The editor is J. Clark Yeoman, L.D.S.

Being timely and of interest, particularly at this time when the various professions are shifting their attitudes and perspectives upon the subjects of medicine and dentistry, the English editorial is published in full as follows:

**"Orthodontia for the Masses"**

"Despite the many splendid facilities which exist for the masses and the children of the masses to secure sound dental treatment, orthodontic service cannot be said to be as easily available as its possibilities and necessity demand.

"The various forms of malocclusion are sufficiently far-reaching in their effects that no system which leaves these cases virtually unattended can be considered entirely satisfactory.

"There is not merely the question of appearance to be considered, but also the more important questions of development and disease.

"While it must be granted that certain difficulties exist in regard to orthodontic treatment, except in the most elementary cases involving simple extraction or ligaturing, comparatively little new organization would be necessary in many of the clinics throughout the country in order to render moderately extensive orthodontic service.

"Orthodontic cases take time; the necessary supervision would interfere to some extent with the work of the clinic, and the construction of appliances is a somewhat delicate matter, but in many cases clinics have workshops attached to them, while in other cases suitable arrangements could no doubt be made outside. Organization within the clinic could comparatively simply deal with the question of the necessary attendances, and the adoption of suitable methods and the elimination of the unduly complicated cases would enable the volume to be handled.

"The recent adoption of schemes for orthodontic service in certain school clinics is a step in the right direction, since it enables irregularities to be observed at a time when they can be most easily corrected, and is an ideal which we hope to see greatly extended.

"Apart altogether, however, from what may or may not be possible in regard to orthodontic service in connection with clinics, there remains a considerable number of cases, even among the masses, which for one reason or another will normally come into private practice. Only with the utmost diffidence would one venture to question whether the cost of certain dental services is too high, but

from the number of untreated cases of malocclusion which exist such a thought certainly does arise.

"In these days, when every dentist is concerned with maintaining the volume of his practice, there would seem to be an excellent opportunity for greater attention to the orthodontic cases which arise, and for the treatment of those cases at fees at which no reasonable parent could cavil, but which, incidentally, he can afford to pay.

"Leaving aside the benefit to the patient, a satisfactory completed orthodontic case is surely one of the best testimonials any dentist can have.

"In many practices and with many individuals orthodontic work is not popular. The fact remains that ordinary training should enable any dentist to handle ordinary cases, and very little in the way of postgraduate courses should make him au fait with more advanced work and the latest methods.

"There is no need for the most complicated cases to be dealt with—specialists' work can still be left to the specialist, as would be the case in medical practice.

"Orthodontia for the masses is an idea full of possibilities, not only for the masses but for the dental profession."

# *BOOK REVIEWS*

### Oral Spirochetes and Related Organisms in Fuso-Spirochetal Disease*

*Oral Spirochetes and Related Organisms in Fuso-Spirochetal Disease* is by David T. Smith, A.B., M.D., Associate Professor of Medicine, Duke University School of Medicine, Durham, N. C., formerly Bacteriologist and Pathologist to the New York State Hospital for Incipient Tuberculosis, Ray Brook, New York.

Here, in monographic form, is presented the most comprehensive work on oral spirochetes and related organisms in fuso-spirochetal disease available in English. The author is recognized as one of the foremost authorities on the subject.

That it is important for practicing physicians, clinicians, pathologists, and medical laboratory workers to be familiar with the disease conditions resulting from fuso-spirochetal infections is attested by a quotation from the introduction:

"While there is no evidence that oral spirochetes alone can produce disease in man, they are probably the most important member in a symbiotic group of anaerobic organisms capable of initiating a severe and often fatal disease."

Dr. William W. Ford, of Johns Hopkins School of Hygiene, has reviewed the chapter on bacteriology.

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### Principles and Practice of the Dental Assistant†

*Principles and Practice of the Dental Assistant* is by Samuel Fine, D.M.D., of Fitchburg, Mass.

This book has been written primarily to help the dentist in properly and easily training his assistant, and it covers the many details with which she should be familiar. Dr. Fine's experiences in the dental field have qualified him for writing such a treatise. It will be a most welcome help to every dentist because it gives the information needed by the assistant briefly and to the point. It is easy to read and understand. Its many photographs and illustrations will interest both the dentist and his assistant. Dentists everywhere will find this book most valuable in saving their own time and in affording a thorough training for their assistants.

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### X-Rays in Dentistry

*X-Rays in Dentistry* is by the Eastman Kodak Company, Medical Division, Rochester, New York.

The purpose of this booklet is to present to the dentist and his assistants those essential rules and practices which will help him to produce radiographs of the teeth and jaws that are anatomically accurate and photographically correct. Furthermore, it is published to serve as a guide in the use of modern methods in simplifying and standardizing radiodontic technic.

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*Published by the Williams & Wilkins Company, Baltimore, Md.
†Published by the Hamilton Publishing Company of Worcester, Mass.

Naturally, a booklet of this type is primarily concerned with operative technic and processing procedure in radiodontia, because they affect the production of authentic radiographs. Therefore it is obviously assumed in the text that the dentist has already had academic training in the application of the various kinds of dental radiographs and in interpretation.

The technical sections of this booklet are plainly compiled from the results of investigations conducted in the X-ray Department of the Kodak Research Laboratories, and by the Medical Division of the Eastman Kodak Company, and published from time to time in the form of scientific papers in various journals.

# *NEWS AND NOTES*

## The American Society of Orthodontists

## 1933 Meeting—April 19, 20, 21, Oklahoma City

From buffalo grass to skyscrapers within the lifetime of its first settlers is a transition witnessed by few cities in America—but this is true of Oklahoma City, capital, metropolis and chief distribution point of Oklahoma.

The present site of Oklahoma City on the morning of April 22, 1889, was bare prairie, whose rolling expanse was broken only by the ribbon of steel that marked the Santa Fe railroad, the station, a farmhouse and a few scattered clumps of trees.

The "Run," April 22, 1889.

By nightfall of the same day—when Oklahoma first was opened to white settlement by the famous "Run"—Oklahoma City was a bustling community of tents and crude frame shacks with a population of several thousand, a town literally "built in a day."

From this picturesque and unique beginning, Oklahoma City has grown during the intervening forty-four years to become a busy metropolis of 206,000 population.

Oklahoma City is one of the seven cities in the United States that more than doubled in population during the decade from 1920 to 1930. Thus, on the bare prairie where less than a half century ago herds of range cattle grazed undisturbed, a city has been built—a monument in stone and concrete to the perseverance and faith of Oklahoma's pioneers.

Today, two thirty-three-story office buildings, a twenty-six-story hotel—the Oklahoma Biltmore, where convention headquarters will be located—and innumerable modern business and industrial structures give Oklahoma City's skyline a distinctly metropolitan appearance and house many rapidly growing and varied industries.

Oklahoma City perhaps is best known throughout the world for its great oil field, largest high gravity pool in the world, located at the city's very door. In this field there are nearly one thousand completed wells, drilled since discovery of the field on December 4, 1928. One well alone, the Discovery Well of the Indian Territory Illuminating Oil Company, has produced 1,100,000 barrels of high gravity oil and now is plugged back as a producing gas well.

Potential production of the Oklahoma City oil field is placed at 12,000,000 barrels of oil daily, if all wells were allowed to produce at full capacity. Under the stringent proration in effect throughout the life of the field, however, total recovery has been restricted to about 120,000,000 barrels in a little more than four years.

In this field was the famous "Wild Mary" Sudik well, which "blew wild" for eleven days before being capped and the flow of black gold was diverted into storage tanks and pipe lines. Here, too, is what is claimed to be the world's largest producing high gravity oil well, the Westgate No. 3 Carey, credited with a potential production of 96,000 barrels daily.

While oil is important to Oklahoma City, it is far from the only item in the city's development.

Located in the geographical center of the eight-state area making up the Great Southwest, this metropolis, in addition to being the political capital of Oklahoma, long has been an important distribution center for a steadily increasing area.

Six railway lines radiate in all directions throughout this territory from Oklahoma City. Also, six U. S. highways provide ten outlets—more U. S. highway outlets than has any other city in the United States. Six air transport lines operate thirty-two passenger schedules into

Capitol Building, Oklahoma City.

and out of Oklahoma City's new 640-acre municipal airport daily, and twelve of these schedules carry mail as well as passengers and express. Also this city is the intersection point of two great transcontinental, lighted, government airways.

The nation's cotton and wheat belts overlap at Oklahoma City, and these two major crops grow in adjoining fields just outside the city limits at many points.

Industry in Oklahoma City is favored by the presence of several major factors recognized as essential to successful manufacturing operations—notably: easily available raw materials, nearby supplies of cheap fuel, adequate transportation facilities, ample financial facilities, and good living conditions.

In this connection it is interesting to note that of the twenty-two items used in the manufacture of batteries by an Oklahoma City factory, all but four are produced in Oklahoma. The chief of those not produced within the state, rubber, of course is not grown in the United States.

Within easy driving distance by automobile from Oklahoma City are many points of interest worthy of mention. One hundred miles to the southwest is Fort Sill, where the U. S. Army school of fire is located; and nearby are Medicine Park and the beautiful Wichita Mountains, popular summer playground area.

Thirty-five miles to the west is Fort Reno, largerst U. S. Army remount station. The famous 101 ranch of Miller Brothers is ninety miles to the north, and by traveling about one

Air view of Oklahoma City.

hundred miles southward one finds Platte National Park, with its beautiful scenery and beneficial sulphur waters.

Oklahoma City offers many attractions to the visitor in its splendid country clubs, golf courses, city parks, beautiful homes and public buildings. In the majestic new State Historical Society Building, near the Capitol, will be found one of the most complete and intensely interesting collections of Indian and Old West relics to be found in the country.

Lincoln Park, largest unit in Oklahoma City's 2,300 acre park system, is located at the northeast edge of the city. It contains 640 acres. Here is a beautiful thirty-six-hole golf course with bent grass greens, a large lake, bathing beach with modern bath houses, a well stocked and attractively arranged zoo, picnic grounds, well equipped playgrounds and other recreational facilities.

Other parks scattered throughout the city are exceptionally well equipped with facilities for tennis, croquet, baseball, handball and other games.

At Lake Overholser at the western border of the city visitors find splendid fishing and boating. Yachting and motor boat enthusiasts ply the waters daily.

Oklahoma City has gained rapidly in popularitiy as a convention center during recent years.

During 1932 a total of 119,221 visitors attending 335 conventions were entertained here. Unusually fine hotel facilities, many points of interest about the city, beautiful parks—and the famous Oklahoma City oil field of which an excellent view may be had from the windows of every downtown hotel—combined with a reputation for hospitality typical of both the South and West have resulted in many large gatherings being held here year after year.

Incidentally, Oklahoma City has one of the largest and most active commercial clubs for a city of its size to be found anywhere. It is putting forth every effort in cooperating with the local arrangements committee toward making the American Society of Orthodontists meeting a great success.

Oklahoma City wants to see you. You have an opportunity to attend a fine meeting, and you will marvel at the progress of your specialty. You will wonder what will be the growth of this interesting city and of the southwest in the next forty-four years. Arrange an automobile or pullman party and come to Oklahoma City.

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## Golf

The Golf Tournament of the Thirty-Second Annual Meeting of the American Society of Orthodontists will be held on Tuesday, April 18, 1933. It will be played over the beautiful championship course of the Oklahoma City Golf and Country Club. This is one of the most interesting courses in the southwest—quoting stars who played in the Trans-Mississippi tournament, held there last June.

Play will be by handicap, except low gross score. Tournament play will start at one o'clock, but those desiring may arrange their round in the morning. A very interesting group of prizes will be provided and a list of the donors will appear in regular program.

As the Oklahoma State Dental Society holds its meeting approximately the same dates as the American Society of Orthodontists an invitation to participate in its golf tournament, which will be held on Monday, April 17, 1933, with a Hot Cha banquet at night, is extended to members of the American Society of Orthodontists. Will it be enjoyable? Come see!

There will be guest prizes for both tournaments. Please send your club handicap as early as possible.

Dr. E. F. Woodring, Chairman, Golf Tournament Committee,
Medical Arts Building,
Tulsa, Oklahoma

## Outline of Program for American Society of Orthodontia, Oklahoma City, April 19-21

The program committee of the American Society of Orthodontia with Dr. Paul G. Spencer as chairman, has been doing some diligent and effective work in the preparation of the literary program for the Thirty-Second Annual Meeting in Oklahoma City, April 19, 20, 21, 1933. The program will be well balanced and of a high order. This announcement of the program is more or less of a general survey, and no attempt is made at a detailed analysis.

Knowing that the subjects of diagnosis and treatment are always of interest to the members, the program committee has arranged for a series of papers to be presented at the morning sessions, discussing several of the most common types of malocclusion. These papers will be presented by some of the most capable men in the profession.

Discussors have been chosen because of their special preparation to develop additional information on the respective subjects. There will also be ample time for general discussion of each paper.

A case report or two will be given to illustrate and coordinate further the subjects being presented. The committee has planned and outlined this phase of the program so that each and every member will carry home something practical that can be of use in his daily routine of diagnosis and treatment of cases, that will bear fruit in practical results.

On the afternoon of the first day there will be a very interesting series of papers.

Dr. Carlton J. Marinus of Detroit, an authority of note on the study of ductless glands, will present a paper on "Endocrine Factors in the Development of the Teeth and Jaws." Dr. C. C. Howard of Atlanta will open the discussion. Other men schooled in this subject will also discuss these problems. General discussions will follow. This will be one of the outstanding features of the meeting.

In orthodontic literature, the effects of hay fever and asthma on the development of the bones of the face have been given little consideration. Since normal breathing is greatly interrupted, it is considered that there must be a lack of general development in the nasal region which will have a deterrent effect upon the growth and development of the dental arches.

Dr. Ray M. Balyeat, Oklahoma City, a nationally known authority on hay fever and asthma, will present his findings in a paper on "Allergic Rhinitis in Children," a consideration of its relation to facial and dental development.

In Montana, bone dust is fed to cattle. What of the children? Another paper of unusual interest will be that presented by Dr. H. G. Harper, Professor of Soils in the Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. We have had many phases of diet and nutrition presented before our sessions. We have prescribed certain foods as a balanced diet for our patients. Results have not been what we desired. Dr. Harper will open the subject of the possibilities of frequent failures in prescribed and balanced diets in his discussion of the deficiency of food elements in soils, especially considering the food elements of calcium and phosphorus. He has done a great amount of research work on the subject and has been recommended through Dr. A. H. Ketcham of Denver, and by Dr. Geo. A. Stiles of the U. S. Department of Animal Husbandry, as the best authority on this subject. Perhaps more than we know, our own children and patients may need "bone dust" or its equivalent in foods containing insufficient amounts of calcium and phosphorus. An able authority on nutrition will open the discussion on Doctor Harper's paper.

Enough new thoughts will be presented this first afternoon to warrant the trip to the meeting.

The third molar region presents problems to the dentist, the exodontist, and increasingly to the orthodontist. Major Leigh Fairbanks, Fort Leavenworth, Kansas, has been making a study of the growth and development of the third molar region and will present his findings at the meeting. He has had facilities especially adaptable to this study, and we may expect a report of much value.

Dr. Joseph E. Johnson, Louisville, Ky., will present a paper on the "Twin Wire Appliance." At the general clinic he will demonstrate further the adaptation and use of this appliance. Doctor Johnson always has something of interest. This appliance has many features of unusual merit.

Again we shall have the pleasure of having a paper by Dr. John Marshall, bringing a further report and a summing up of the research work in connection with the treatment of monkeys that have been fed a varied diet at the University of California.

This will be a worthwhile report and should be heard by every member of the organization.

Dr. Homer B. Robinson, Hutchinson, Kansas, a member of the program committee, will have a carefully chosen list of case reports which will be comparable in character to that of other papers. His experience in preparation of programs assures us of case reports of unusual interest.

Dr. Earnest M. Bach, Toledo, Ohio, past president of the Great Lakes Society and a member of the program committee, has a treat in store for us in the general clinic which he is arranging. He has a surprise for you—a new feature. You will like it.

A case report of a very unusual nature will be presented by Dr. R. C. Willett. The case has been under observation for some six years, and the report will be quite a feature of the program. Those who have heard Dr. Willett know that his presentation will be well and uniquely presented. This case report is of such interest that there will be prepared discussions to cover fully all angles of the case.

This is merely an outline of what will be presented at the meeting in Oklahoma City. It would be impossible to give the importance of each presentation in detail. This is enough to indicate the high type of program that will be presented.

A complete program in detail will be published in the March issue of the JOURNAL.

WILLIAM E. FLESHER, President.

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## The American Board of Orthodontia

The fourth annual meeting of the American Board of Orthodontia will be held in Oklahoma City, Okla., at the Hotel Biltmore on April 17 and 18, 1933.

Those orthodontists who desire to qualify for a certificate from the Board should secure the necessary application form from the Secretary. Applications received up to the date of the meeting in Oklahoma City will receive preliminary consideration by the Board, and the required examination will be outlined. It will not be necessary for new applicants to appear before the Board at this time. However, such applicants should appear before the Board at the next annual meeting.

Attention is called to the following resolutions adopted by the Board:

Any person desiring to make application to the Board for a certificate shall have been in the exclusive practice of orthodontia for a period of not less than five years or an equivalent to be determined by the Board and based upon the following conditions:

First, an instructor in orthodontia in a school satisfactory to the Board.

Second, an associate in the office of an orthodontist whose standing is satisfactory to the Board.

It is, however, definitely to be understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontia in his own name.

ALBERT H. KETCHAM, President,
Republic Building,
Denver, Colo.
OREN A. OLIVER, Secretary,
Medical Arts Building,
Nashville, Tenn.

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## Chicago—Host City of Centennial Dental Congress—a Dental Center

Chicago, host city for the Centennial Dental Congress which includes the Diamond Jubilee of the American Dental Association, has valid claim to the title of America's leading dental center. Out-of-town visitors to the Congress will have ample opportunity to convince themselves

of this fact during the week of August 7-12, 1933, when the Congress will be in session at the Stevens Hotel.

Chicago is the home of the American Dental Association. In May, 1931, the Association acquired its own home located at 212 E. Superior Street. In it are housed all the central activities such as the secretary's office, library bureau, bureau of chemistry, council on dental therapeutics, etc. The American Dental Association will hold open house during the week of the Congress in order that every visitor may be privileged to see the Association at work in its own splendid facilities.

As many thousands of dentists throughout the world who received their dental education in Chicago well know, this city has some of the leading dental colleges of the country, viz., Chicago College of Dental Surgery, Dental Department of Loyola University, the University of Illinois College of Dentistry and the Northwestern University Dental School. Their combined alumni form a very substantial portion of the world's dental population. To many, the week in Chicago during the Congress will be an unusually attractive homecoming. Among the 15,000 dentists who are expected to attend the Congress will be many former classmates and friends of most practicing dentists. What an opportunity for a reunion!

Another claim of Chicago that merits mention is the fact that this city is annual host to the Midwinter Meeting of the Chicago Dental Society. Within the past decade the reputation of this meeting has spread to every nook and cranny of the country so that it now occupies an enviable position among dental meetings. The Chicago Dental Society, sponsor of the Congress, is the largest local dental society in the world.

In dentistry's Hall of Fame we come upon the names of many Chicagoans who have helped make dental history: W. W. Allport, G. V. Black, Truman W. Brophy, Galvin S. Case, George H. Cushing, T. L. Gilmer, Hart J. Goslee, L. P. Haskell, Edmund Noyes, J. H. Prothero, C. P. Pruyn; and many others could be enumerated if space permitted. Certainly this is a roster of which Chicago may well be proud.

Yes, the host city for the Congress is a dental center. All the dental organizations and institutions in Chicago have been planning for months to make the Congress and the Diamond Jubilee of the American Dental Association the outstanding dental meeting of all time. Members of the Association are not only cordially invited, but urged to attend this meeting which will be held in conjunction with A Century of Progress Exposition.

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## Washington University Dental Alumni Association's Annual Meeting

The annual meeting of the Washington University Dental Alumni Association will be held at the Washington University Dental School, St. Louis, Mo., February 20, 21, 22.

Lectures will be given by the following members of the faculty: Doctors E. P. Brady, Virgil Loeb, L. H. Jorstad, Edgar Keys, Wm. G. Becke, Robert Mueller, Clarence Simpson, H. C. Pollock.

In addition to the above lectures the following men will give special courses: Dr. George Winter in exodontia, Dr. A. P. O'Hare in prosthesis, and Dr. Max Kornfeld in metallurgy.

No charge will be made for these courses.

Leo M. Shanley, Secretary,
4482 Washington Avenue,
St. Louis, Mo.

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## St. Louis University Dental Alumni Reunion

Following the custom of the past few years, the members of the alumni of the St. Louis University School of Dentistry will again feature lectures and clinics at their annual reunion.

The lectures and clinics will be illustrated with interesting specimens and slides, and will be given by well known and prominent alumni.

The meeting this year will be held in the St. Louis University Gymnasium on Friday, March 31, and Saturday, April 1.

## The Great Lakes Association of Orthodontists

The annual meeting of the Great Lakes Association of Orthodontists will be held in Cleveland, Ohio, February 27 and 28, 1933.

A cordial invitation is extended to all ethical practitioners of dentistry and orthodontia to attend this meeting.

RALPH P. HOWARTH, Secretary-Treasurer,
1140 Hanna Building,
Cleveland, Ohio.

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## Dental Society of the State of New York—Preliminary Program

The Dental Society of the State of New York will hold its sixty-fifth annual meeting in Syracuse, New York, May 11, 12 and 13, 1933. Literary exercises, exhibits, etc., will be held at the Hotel Syracuse. Harvey J. Burkhart, 800 E. Main St., Rochester, N. Y., is chairman of the Program Committee; Emory Thompson, 333 Linwood Ave., Buffalo, N. Y., chairman of the Clinic Committee, and Thomas R. Cullen, Oswego, N. Y., is chairman of the Exhibits Committee. The Executive Council will convene for the transaction of the business of the Society Wednesday, May 10, at 8 P.M.

The essayists are: I. Lester Furnas, Cleveland, Ohio; John Scholten and Harry E. Hanson of Cedar Rapids, Iowa; P. G. Puterbaugh, Chicago, Ill.; Walter Chappelle, Buffalo, N. Y.; Arthur B. Gabel, Philadelphia, Pa.; James E. Aiguier, Philadelphia, Pa., and Chalmers J. Lyons of Ann Arbor, Mich.

During the time of the meeting, sessions of the New York State Dental Hygienists' Association and the Dental Assistants' Association will be held.

Headquarters will be at the Hotel Syracuse, and reservations should be made direct with the hotel management.

For information with reference to the literary exercises, clinics, etc., apply to:

A. P. BURKHART, Secretary,
57 E. Genesee St.,
Auburn, N. Y.

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## Illinois State Dental Society

The sixty-ninth annual meeting of the Illinois State Dental Society will be held at Peoria, Ill., May 9, 10, 11.

A. B. PATTERSON, President,
406 Morris Building,
Joliet, Illinois.
BEN H. SHERRARD, Secretary,
300 Rock Island Bank Building,
Rock Island, Illinois.

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## North Carolina Dental Society

The fifty-ninth annual meeting of the North Carolina Dental Society will be held at the University of North Carolina, Chaptel Hill, June 6, 7, and 8. All members of the American Dental Association are cordially invited.

D. L. PRIDGEN, Secretary-Treasurer,
Fayetteville, N. C.

## Thomas P. Hinman Midwinter Clinic

The annual Thomas P. Hinman Midwinter Clinic will be held Monday and Tuesday, March 13 and 14, at the Atlanta Biltmore Hotel, Atlanta, Ga.

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## New York Society of Orthodontists

The annual meeting of the New York Society of Orthodontists will be held at the Hotel Waldorf Astoria, New York City, on Monday and Tuesday, March 13 and 14. The opening session Monday will begin at 9:30 A.M. An exceptionally valuable program has been arranged. All interested physicians and dentists are cordially invited to attend.

LOWRIE J. PORTER, President,
730 Fifth Avenue,
New York, N. Y.
FRANKLIN A. SQUIRES, Secretary-Treasurer,
Medical Centre,
White Plains, N. Y.

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## The American Society for the Advancement of General Anesthesia in Dentistry

The next meeting of the American Society for the Advancement of General Anesthesia in Dentistry will be held at the Barbizon-Plaza Hotel, New York City, on Tuesday evening, February 28, beginning with a dinner at 7 P.M. The scientific session will start at 8:15 P.M.

The speaker will be T. Drysdale Buchanan, M.D., New York City. His subject will be "A Critical Survey and Personal Observations of Emergency Measures Available in General Anesthesias."

M. HILLEL FELDMAN, President,
730 Fifth Avenue,
New York, N. Y.
LEONARD S. MORVAY, Secretary,
76 Clinton Avenue,
Newark, N. J.
JAMES TAYLOE GWATHMEY, Honorary President,
133 E. 58th Street,
New York, N. Y.

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## American Society of Stomatologists

The tenth anniversary meeting of the stomatologic movement in America by the American Society of Stomatologists and its affiliated societies will be held at the Hotel McAlpin, New York City, on Thursday and Friday, April 27 and 28. The following sessions will be held:

1. General Session: Thursday evening, April 27, 8:30 P.M., for the presentation of the scientific program and reports. The educational report will also deal with "The Transitory Stomatologic Program" as it concerns recent dental graduates and practicing dentists; the needed expansion of hospital and postgraduate teaching facilities for dentists; and the present needs of educational and legal recognition of the dental qualification.

2. Executive session: Friday morning, April 28, 10 A.M.

3. Stomatologic clinics: Friday afternoon, April 28, 2 P.M. The general session will be preceded by an informal dinner at the Hotel McAlpin to which members of the professions and

their guests are welcome. Those wishing to participate in clinics, discussions, etc., and to attend the dinner will please communicate with Dr. Irene G. Woodcock, Chairman, Local Arrangements Committee, Wickersham Professional Building, 133 East 58th Street, New York City.

For further particulars address the secretary of the Society.

DR. LLOYD L. BAKER, President,
DR. ALFRED J. ASGIS, Secretary,
310 West 72nd Street,
New York, N. Y.